Table of Contents

Physical Description 296

Functional Description 296

I/O Signals for Extended I/O Driver Board and Main Board 297

Technical Description 299

Interface 299
- Connector PIN Description: J1 301
- Connector PIN Description: J2 303
- Connector PIN Description: J3 305

Address Decoding 308
- I/O Address Map 308

Interrupt Request 310

Mikohn Interface 310

Button Switches 310

Lamp Drivers 311
- Button Lamps/LEDs 311
- Bill Acceptor Lamps 311
- Animation and Light Tower Lamps 311

Communication 312

DIP Switch Banks 312

Hard Meters 312

Door Switch Monitoring 313
- Door Security Signal Labels 313

Expansion I/O 313

Opto Isolation 313

Power - Isolated Supplies 314
- Battery Switchover 314

Reset Circuitry 314

Firmware 314

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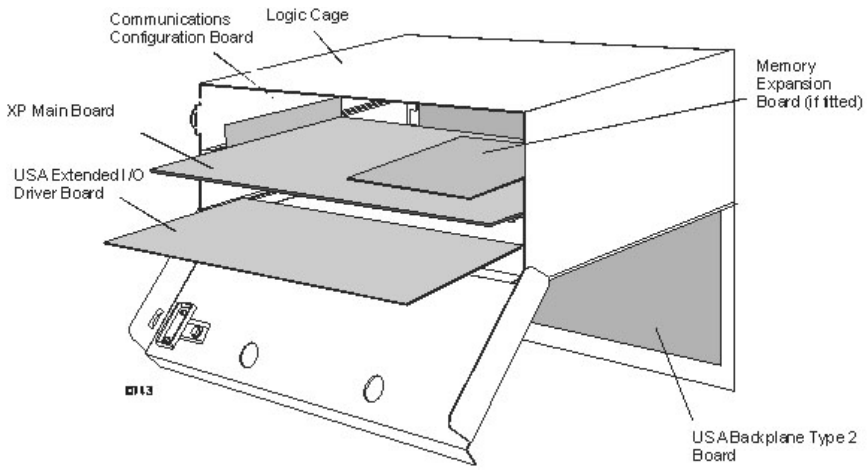
PHYSICAL DESCRIPTION

The Extended I/O Driver II Board (I/O driver board) is located inside the logic cage and connects directly to the backplane board via two 64-way DIN connectors and one 96-way DIN connector. Two extractors are positioned on the front edge of the I/O driver board to assist removal of the boards from the edge connectors.Soft tilts are tilt/error conditions that allow game play to continue. There are two types of soft tilts: those which must be resolved by an attendant, and those that reset themselves when the cause of the tilt is no longer present and a predetermined period of time has elapsed.



Driver Board Location

FUNCTIONAL DESCRIPTION

The I/O driver board is a subassembly of a system. Some I/O to peripherals is achieved through the main board and some through this I/O board. The I/O driver board assists in the writing of data to various outputs, such as hard meters and light tower lamps. The board also reads data from inputs, such as the button switches. The following section indicates the allocation of I/O between the I/O driver board and the main board.

The board supports the electronic gaming machine (EGM) platform detailed in this manual.

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I/O Signals for Extended I/O Driver Board and Main Board

Description	I/O	Qty	Name	Type	Location
Hard Meters	O	6	HM1-6	OC24	I/O Driver
Button switches	I	14	PBS1-14	24->TTL	I/O Driver
Button lamps	O	14	PBL1-14	OC24	I/O Driver
Optical Door Switch	I O	1 1	DOPTIN DOPTOUT	TTL TTL	I/O Driver Main
Battery Backed Logic Door Switch	I O	1 1	BBLI BBLO	TTL	I/O Driver
Animation Lamps	O	3	AL1.3	OC24	I/O Driver
Logic Door Security	O I	1 1	LDSECO LDSECIN	TTL	I/O Driver
Light Tower Lamps	O	4	LTL1-4	OC24	I/O Driver
Hopper	I O	2 3	HOPHIGH HOPCOIN HOPTEST HOPON HOPDIR	TTL OC24	I/O Driver Main
Mikohn	O O I	2 2 1	MIKPULS MIKTX MIKTX_EN MIKRX	OPTO RS422 TTL RS422	I/O Driver
Expansion Serial	O I	2 2	Driver Spare	TTL	I/O Driver
Expansion Parallel	I/O	4	SpareIO	TTL	I/O Driver
Mechanical Door Switch	I	1	MECHSW	TTL	Main
Cashbox Door Switch	I	1	CBOXSW	TTL	Main
SEC Door Switch	I	1	SECSW	TTL	Main
Jackpot key switch	I	1	JPSW	TTL	Main
Audit key switch	I	1	AUSW	TTL	Main
CC-62	I O	3 1	CCSEN CCERROR CC_CRED CCINH	TTL	Main
Jackpot Bell	O	1	JPBELL	OC24	Main
Solenoid Diverter	O	1	SOLDIV	OC24	Main
Solenoid Optic	I	1	SOLOPT	TTL	Main

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I/O Signals for Extended I/O Driver Board and Main Board (continued)

Description	I/O	Qty	Name	Type	Location
DUART Port 6	O I	3 3	TxD, DTR, RTS RxD, DCR, CTS	TTL TTL	Expanded I/O
DUART Port 7		3 3 +2	TxD, DTR, RTS RxD, DCR, CTS	TTL TTL	Expanded I/O
DUART Parallel	O		BACCLIT[1..8]	TTL	Expanded I/O
DIP SWITCH 1	I	8	DIPSW1	OC24	Expanded I/O
DIP SWITCH 2	I	8	DIPSW2	TTL	Expanded I/O
Battery Backed Door Security	I/O	6	DDOR_NC,GDOR_NC SEC_NC DDOR_NO, GDOR_NO SEC_NO	TTL/ Battery	Expanded I/O

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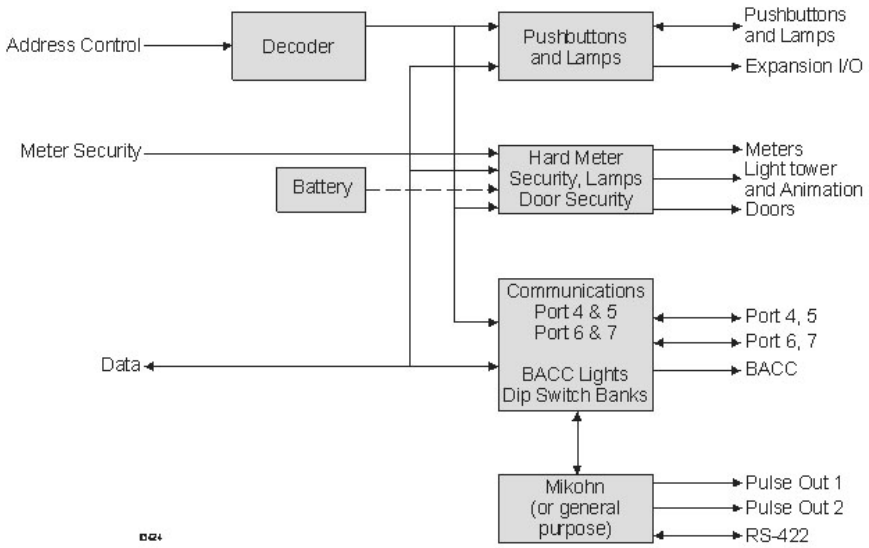
TECHNICAL DESCRIPTION

The I/O driver board requires signals in addition to those listed in Figure 1. These signals are mainly control signals, various power supply lines, and the address and data buses provided by the main board that connect to the I/O driver board via the backplane board. A functional diagram is shown below.



Functional Diagram

Interface

All signals to the I/O driver board, including power and ground, connect via two 64-way DIN connectors (J1 and J2) and a 96-way DIN connector (J3). Figure 3 shows the approximate positioning in the logic cage of the main board (with headers P20, P22 and P21) relative to the I/O driver board (with headers J3, J1, and J2).

Connector J1 includes most of the main I/O lines, such as button LEDs/lamps and switches, light tower lamp outputs, animation lamp outputs, hard meter outputs and all spare I/O lines, whether for driver outputs, simple TTL I/O, or serial communication lines. The connector also includes power for button LEDs.

All control, address, and data lines enter the printed circuit board assembly (PCBA) from Connector J2. This connector has all the power and ground pins for 24V DC and VCC. The Mikohn interface, address and data lines from the main board and door security lines are on this connector. Isolated 12V is no longer required for use with the Mikohn interface section and is not implemented on the this board.

Connector J3 provides functions extended from the I/O driver board, namely communication ports 6 and 7, door security, bill acceptor animation lamps, and

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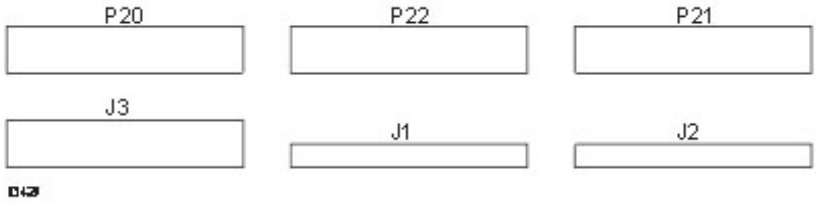
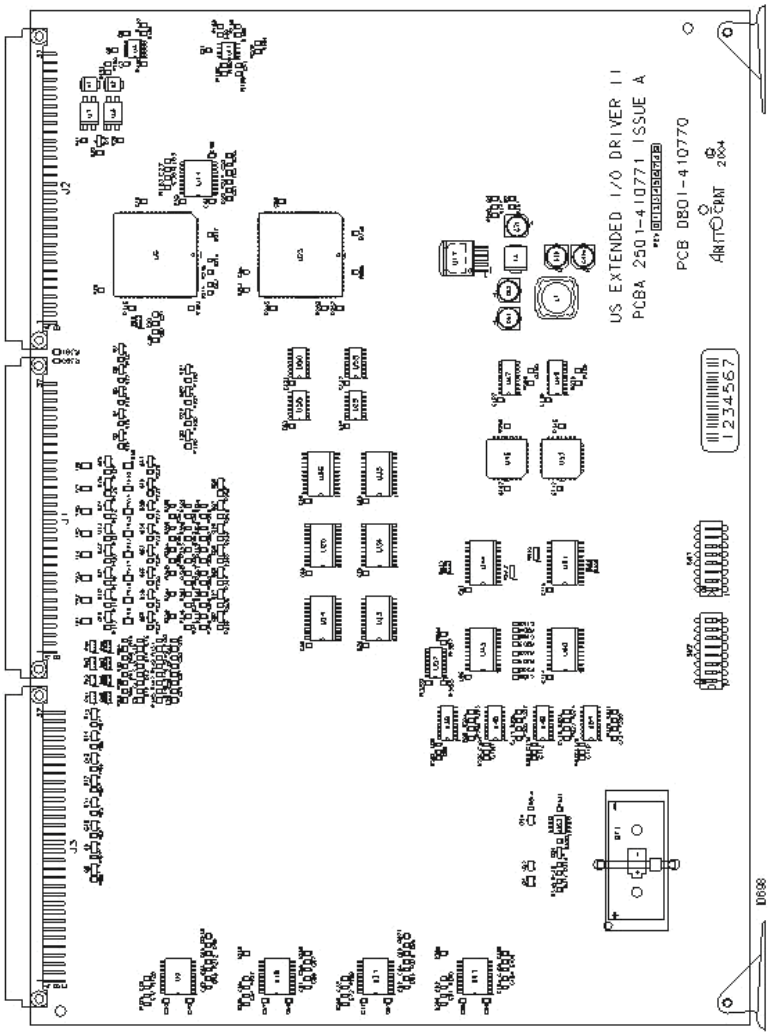
Interface (continued)

additional access for VCC and ground.



Main Board and I/O Board Connectors



I/O Board Main Component Locations

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Connector PIN Description: J1

PIN	PIN Name	Description
A1	GND	Ground
B1	GND	Ground
A2	PBS1	Button switch 1
B2	PBS2	Button switch 2
A3	PBS3	Button switch 3
B3	PBS4	Button switch 4
A4	PBS5	Button switch 5
B4	PBS6	Button switch 6
A5	PBS7	Button switch 7
B5	PBS8	Button switch 8
A6	PBS9	Button switch 9
B6	PBS10	Button switch 10
A7	PBS11	Button switch 11
B7	PBS12	Button switch 12
A8	PBS13	Button switch 13
B8	PBS14	Button switch 14
A9	SPARESW1	Spare 24V Input 1
B9	SPARESW2	Spare 24V Input 2
A10	PBL1	Button lamp 1
B10	PBL2	Button lamp 2
A11	PBL3	Button lamp 3
B11	PBL4	Button lamp 4
A12	PBL5	Button lamp 5
B12	PBL6	Button lamp 6
A13	PBL7	Button lamp 7
B13	PBL8	Button lamp 8
A14	PBL9	Button lamp 9
B14	PBL10	Button lamp 10
A15	PBL11	Button lamp 11
B15	PBL12	Button lamp 12
A16	PBL13	Button lamp 13
B16	PBL14	Button lamp 14
A17	DRVSP1	Spare 24V output 1
B17	DRVSP2	Spare 24V output 2
A18	SPAREIO0	Spare TTL I/O

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Connector PIN Description: J1 (continued)

PIN	PIN Name	Description
B18	SPAREIO1	Spare TTL I/O
A19	SPAREIO2	Spare TTL I/O
B19	SPAREIO3	Spare TTL I/O
A20	LED_PWR	+12VDC
B20	LED_PWR	+12VDC
A21	SPRTS	Spare serial
B21	SPCTS	Spare serial
A22	SPRXD	Spare serial
B22	SPTXD	Spare serial
A23	GND	Ground
B23	GND	Ground
A24	HM1	Hard meter 1
B24	HM2	Hard meter 2
A25	HM3	Hard meter 3
B25	HM4	Hard meter 4
A26	HM5	Hard meter 5
B26	HM6	Hard meter 6
A27	LTL1	Light tower lamp 1
B27	LTL2	Light tower lamp 2
A28	LTL3	Light tower lamp 3
B28	LTL4	Light tower lamp 4
A29	AL1	Animation lamp 1
B29	AL2	Animation lamp 2
A30	AL3	Animation lamp 3
B30	HOPCOIN	Hopper coin output
A31	HOPHIGH	Hopper Hi probe
B31	DOPTIN	Door optic in
A32	24V	+24 VDC
B32	24V	+24 VDC

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Connector PIN Description: J2

PIN	PIN Name	Description
A1	P12VDC	12V output for coin validator
B1	GND	Gnd
A2	VCC	5V from main board
B2	VCC	5V from main board
A3	LDOR_NC	Logic door switch (normally closed)
B3	LDOR_COM	Logic door switch (common)
A4	LDOR_NO	Logic door switch (normally open - gnd)
B4	NC	
A5	NEILO	CPU, ILO interrupt
B5	NDACK	CPU, data acknowledge
A6	IRQDMON	“DEMON” - Debug interrupt
B6	NEIOR	CPU, IO read signal
A7	NEIOW	CPU, IO write signal
B7	NERESET	CPU, external reset output
A8	ECLK8M	CPU, clock signal
B8	GND	Ground
A9	24V	+24V
B9	24V	+24V
A10	NC	
B10	NC	EA12
A11	NC	CPU, address bus - bit EA11
B11	EA10	CPU, address bus
A12	EA9	CPU, address bus
B12	EA8	CPU, address bus
A13	EA7	CPU, address bus
B13	EA6	CPU, address bus
A14	EA5	CPU, address bus
B14	EA4	CPU, address bus
A15	EA3	CPU, address bus
B15	EA2	CPU, address bus
A16	24V	+24 VDC
B16	24V	+24 VDC
A17	GND	Ground
B17	GND	Ground
A18	ED7	CPU, data bus

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Connector PIN Description: J2 (continued)

PIN	PIN Name	Description
B18	ED6	CPU, data bus
A19	ED5	CPU, data bus
B19	ED4	CPU, data bus
A20	ED3	CPU, data bus
B20	ED2	CPU, data bus
A21	ED1	CPU, data bus
B21	ED0	CPU, data bus
A22	VCC	+5VDC
B22	VCC	+5VDC
A23	GND	Ground
B23	GND	Ground
A24	NC	
B24	NC	
A25	NC	
B25	NC	
A26	EMIKP2	Data A2
B26	EMIKN2	Machine ID2
A27	NC	
B27	NC	
A28	NC	
B28	NC	
A29	NC	Reserved for isolated +12VDC input return
B29	NC	Reserved for isolated +12VDC input
A30	EMIKP1	Data A1
B30	EMIKN1	Machine ID1
A31	TXDA+	Mikohn 422 serial Comms
B31	TXDA-	Mikohn 422 serial Comms
A32	RXDA+	Mikohn 422 serial Comms
B32	RXDA-	Mikohn 422 serial Comms

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Connector PIN Description: J3

PIN	PIN Name	Description
A1	NC	
B1	232DTR7	COM port 7
C1	VCC	
A2	232DSR7	COM Port 7
B2	NC	
C2	GND	
A3	NC	
B3	NC	reserved for12VDC isolated
C3	NC	
A4	NC	
B4	232DTR6	COM port 6
C4	NC	
A5	232DSR6	COM port 6
B5	NC	
C5	NC	
A6	NC	
B6	NC	reserved for 12VDC isolated
C6	VCC	
A7	NC	reserved for 12VDC isolated return
B7	232TXD6	COM port 6
C7	GND	Ground
A8	232RXD6	COM port 6
B8	232RTS6	COM port 6
C8	GND	Ground
A9	232CTS6	COM port 6
B9	232DCD6	COM port 6
C9	NC	
A10	NC	reserved for 12VDC isolated return
B10	232TXD7	COM port 7
C10	NC	
A11	232RXD7	COM port 7
B11	232RTS7	COM port 7
C11	NC	
A12	232CTS7	COM port 7
B12	232DCD7	COM port 7

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Connector PIN Description: J3 (continued)

PIN	PIN Name	Description
C12	NC	reserved for 12VDC isolated
A13	NC	
B13	NC	
C13	NC	
A14	NC	
B14	NC	
C14	NC	
A15	NC	
B15	NC	
C15	VCC	5 VDC
A16	NC	
B16	BACCLIT8	BACC denomination lamp 8
C16	GND	Ground
A17	BACCLIT1	BACC denomination lamp 1
B17	BACCLIT2	BACC denomination lamp 2
C17	NC	reserved for 12VDC isolated
A18	BACCLIT3	BACC denomination lamp 3
B18	BACCLIT4	BACC denomination lamp 4
C18	NC	
A19	BACCLIT5	BACC denomination lamp 5
B19	BACCLIT6	BACC denomination lamp 6
C19	NC	
A20	BACCLIT7	BACC denomination lamp 7
B20	NC	
C20	NC	
A21	AL4	Animation lamp 4
B21	NC	
C21	NC	
A22	AL5	Animation lamp 5
B22	NC	
C22	NC	
A23	NC	Animation lamp 6
B23	NC	
C23	NC	
A24	SEC[5]	Drop box door switch (normally open)

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Connector PIN Description: J3 (continued)

PIN	PIN Name	Description
B24	DDOR_NC	Drop box door switch (normally closed)
C24	NC	
A25	SEC[4]	Drop box door switch (common)
B25	NC	
C25	NC	
A26	SEC[1]	Game door switch (normally open)
B26	GDOR_NC	Game door switch (normally closed)
C26	NC	
A27	SEC[0]	Game door switch (common)
B27		
C27	VCC	5VDC
A28	SEC[3]	SEC Door switch (normally open)
B28	SEC_NC	SEC Door switch (normally closed)
C28	VCC	5VDC
A29	SEC[2]	SEC Door switch (common)
B29	NC	
C29	GND	Ground
A30	NC	
B30	NC	
C30	GND	Ground
A31	NC	
B31	NC	
C31	GND	Ground
A32	NC	
B32	NC	
C32	GND	Ground

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Address Decoding

The I/O driver board includes address decoding, which defines the address of each I/O on the board. Refer to the XP Main Board module for a description of the I/O connected directly to the main board. The addresses of all I/Os on the I/O driver board and the main board are listed below. The various signal names for main board I/O are included for completeness.

I/O Address Map

Board	Address	Read/write	Bit/s	Name	Spares
MAIN BD.		WR			
NWRCS0	0x3010400		D7	DOPTOUT	
NWRCS1	0x3010410		D0	CCINH	
			D2	HOPDIR	
NWRCS5	0x3010450		D0	SOLDIV	
			D1	JPBELL	
			D2	HOPON	
NWRCS4	0x3010440		D2	HOPTEST	
I/O DRIVER	0x3012000	WR	D0..D7	PBL1..8	
	0x3012010		D0..D7	PBL9..14	4 + 2
	0x3012020		D0..D5	HM1..6	2x NC
	0x3012030		D0..3	LTL1..4	
			D4..6	AL1..3	1x NC
	0x3012070		D0	LDSECO	
			D1	GDSHRIN	
			D2	BDSHRIN	
			D3	DDSHRIN	
	0x3012380 base address				
			Parallel Port Duart Channel 6,7	BACCLIT[1..8]	
Main Board		RD			

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I/O Address Map (continued)

Board	Address	Read/write	Bit/s	Name	Spares
NIOCS3	0x3010580 is base address		Error	CCERROR	
			Select	CCSEN	
			PE	CCRED	
			Busy	SOLOPT	
			P3	AUSW	
			P4	JPSW	
			P5	BASW	
			P6	MECHSW	
			P7	CBOXSW	
I/O Driver	0x3012000	RD	D0..7	PBS1..8	
	0x3012010		D0..7	PBS9..14	4 + 2 EXP
	0x3012020		D0	GDSHRO	
			D1	BDSHRO	
			D2	DDSHRO	
			D4	HOPCOIN	
			D5	HOPHIGH	
			D6	DOPTIN	
			D7	LDSECIN	
	0x3012200		D0..D8	DIPSW1[1..8]	Note: Bitmap
	0x3012210		D0..D8	DIPSW2[1..8]	Note: Bitmap
	0x3012220		D4..D7	IRQ_CS DUART	Channel 4..7
I/O Driver		RD/WR			
	Comm Ports 4 & 5		I/O DRIVER		
	0x3012100		Channel A	MIKOHN	
	0x3012140		Channel B	EXP SER	Rx Tx RTS CTS
	0x3012180		Parallel	EXP I/O	6x TTL I/O
			Comm Ports 6 & 7		
	0x3012300 base address	Channel A	VLC	Rx Tx RTS CTS DTR DCD	
	0x3012340 base address	Channel B		Rx Tx RTS CTS DTR DCD	

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Interrupt Request

The following shows the interrupt request bit map for COM ports 4, 5, 6 and 7. Read only address “0x3012220” provides a quicker way to determine which channel generated the interrupt.

Bit	Label	Description
D4	INTA	DUART COM port 4 – address 0x3012100
D5	INTB	DUART COM port 5 – address 0x3012140
D6	INT2A	DUART COM port 6 – address 0x3012300
D7	INT2B	DUART COM port 7 – address 0x3012340

Mikohn Interface

The I/O driver board interfaces with the Mikohn Progressive Super Controllers (CON2). The interface:

- Supports two separate output only Mikohn Super Controller (CON2) systems via optically coupled pulse control; each output pulse switches a minimum of 20mA.
- Provides a four wire, bidirectional RS422/485 port.

Button Switches

Sixteen button switch inputs are included. The I/O driver board contains additional circuitry to allow a wide range of button switch voltage. Historically, Aristocrat EGMs used 24V DC for button switch voltage, but new EGMs could use a voltage as low as 5V DC. To allow backward compatibility, the button inputs accept wide range voltage levels. To maintain simplicity of the cabling, this same voltage is used to drive the lamps/LEDs. For 410771 Issue C, the voltage is set at +12V DC. The button switch outputs are filtered to reduce noise on the signals and converted to TTL level for processing.

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Lamp Drivers

Lamp drivers includes all button, bill acceptor entry, animation and light tower lamps. All lamps are driven by open collector transistors capable of sinking 600mA.

Button Lamps/LEDs

Both button lamp and LED outputs are supported in this implementation. Light emitting diodes (LEDs) can be used on new configuration EGMs. Older configurations used incandescent lamps. The I/O driver board supports both options.

The LEDs are rated at 12V DC. The power for the LEDs is supplied by the driver board (LED_PWR).

The I/O driver board provides the power for incandescent lamps as well. No warm up resistors are used, as warm up resistors do not improve the longevity of the light globes. Furthermore, as LEDs are used in the new EGM configurations, warm up resistors are detrimental: they cause the LEDs to remain on.

All button lamp/LED outputs have transient suppression devices to provide protection from transient pulses and electrostatic discharge (ESD).

Bill Acceptor Lamps

The I/O driver board has eight lamp or LED outputs used to indicate the bill acceptor denomination for machines with this feature.

Bill Acceptor Denomination

Lamp	Data Bit	Label	Description
1 to 7	D0.. D6	BACCLIT1..7	Available bill values - denomination lamps
			BACCLIT1 = highest denomination LED
			BACCLIT7 = lowest denomination LED
8	D7	BACCLIT8	“Insert Bill” lamp

Animation and Light Tower Lamps

Animation lamps and light tower lamps are driven in the same manner and provide for warm up resistors, though these are not intended for population. There are six animation lamps and four light tower lamps.

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Communication

The I/O driver board design provides four serial ports, labelled COM4 to COM7. Serial ports COM0 to COM3 are on the main board.

COM4 is allocated to the Mikohn Interface as above.

COM5 is an RS-232 compatible port, with RTS and CTS used as hardware handshake, or as general input or output pins.

COM6 and COM7 are modem-compatible ports with full handshaking.

DIP Switch Banks

Two 8-bit dual in-line package (DIP) switch banks are provided. Switch settings are shown below.

Switch Bank	Switch No.	Data Bus	Bit Status	Switch Position	Description
DIPSW1	1 to 4	D0...D3	BCD	“1” = “OFF” “0” = “ON”	Up to 16 denomination selections
	5	D4	“1” “0”	“1” = “OFF” “0” = “ON”	Enable Gamble Disable Gamble
	6	D5	“1” “0”	“1” = “OFF” “0” = “ON”	Enable tokenization Disable tokenization
	7	D6	“1” “0”	“1” = “OFF” “0” = “ON”	Enable max bet lockout Disable max bet lockout
	8	D7		“1” = “OFF” “0” = “ON”	Spare
DIPSW2	1 to 8	D0...D7		“1” = “OFF” “0” = “ON”	Spare

Hard Meters

The hard meters are driven by open collector transistors capable of sinking 600mA. The meters can be rated up to 24V DC.

The board incorporates detection circuitry on each of the six meter outputs. If any of the meters is disconnected or omitted from the assembly, a flag is set in UART U6. The flag can be read via the data bus.

If fewer than six meters are needed, the meter detection circuitry on each of meters four, five and six can be disabled by removing the link for each meter not required. The links are located near the DIP switch packs.

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Door Switch Monitoring

Door switches are monitored by battery backed circuitry, to record the event of a door open even when power is OFF. The circuitry also records logic cage opens if the I/O driver board is removed while the power is OFF. Four switches are monitored as shown below.

Each of the four registers is written with a nonzero value while power is ON. If a door is opened while power is OFF, the register is parallel loaded with a value of zero. On power ON, the register can be read. A zero value indicates that a door was opened or the board was removed.

Each of the four registers operates from battery power while power is OFF. To prevent the battery discharging during the power OFF condition, register outputs are connected to a tri-state buffer also supplied by battery power. When power OFF, a logic driven circuit forces the buffer into its tri-state condition, and there is no wasted battery power from the output circuits.

A VCC supply monitor prevents inadvertent clocking during power ON or power OFF. Clocking is inhibited when the supply voltage is below the monitor's threshold, which is in the range of 4.50 to 4.75V.

Door Security Signal Labels

Door/Device	Signal Label
Logic Cage Door	SECR 0
Mech Meters	SECR 1
Main Door	SECR 2
Drop Box Door	SECR 3

Expansion I/O

In addition to the I/Os above, the "expansion" provides I/Os reserved as spare on previous model I/O driver boards, but since used to provide the additional drivers required by the later platforms available; two 24V DC driver outputs and two button switch type inputs. In addition, six expansion TTL I/Os are included. The TTL I/O lines are filtered to prevent external noise entering the board through these lines.

Opto Isolation

Optical isolation is not provided for signals on COM6 and COM7. The PCB was designed with the optical components located, but not populated if optical isolation becomes a future requirement.

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Power - Isolated Supplies

The I/O driver board does not provide isolated signal circuits and, as a consequence, isolated power supplies are not provided. However, in the event of a future requirement for signal and supply isolation, room is provided on the PCB for two isolated supplies. Signal names are retained from the isolated supply sources once envisioned for the board: ISOL5V and ISOLGND for the Mikohn signals only, and P5VI and GNDISOL for signals on COM6 and COM7.

Battery Switchover

A discrete circuitry implementation selects between battery power or power outlet derived VCC, depending on which is greater, for the circuitry that requires it.

Reset Circuitry

A single power-on-reset signal is provided from the main board referred to as NERESET. The signal ensures that at power ON:

- All lamps are OFF
- There is no current in the hard meter coils
- Both UARTs are reset
- The changeover from battery power to VCC is assisted by the low impedance to VCC

Firmware

Two Programmable Logic Devices (PLDs) are used for address decoding. These are U46 and U52.

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Table of Contents

Physical Description 316

Functional Description 316

CCB Part Number and Configuration 316

RS-232 Interface 316

RS-232 Interface Signals, Channel 2 316

Connector PIN Assignment 317

Connector PIN Assignment 319

General Maintenance 319

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28-01186-01
10 Nov 2006

PHYSICAL DESCRIPTION

Location and Access

The Communications Configuration Board (CCB) is located within the logic cage where it connects to the main board via a 72 pin SIMM socket. The CCB configures the internal serial communications ports 2 and 3 to various communication protocols.

FUNCTIONAL DESCRIPTION

The main board has four serial channels: 0, 1, 2 and 3. Channel 0 has a non-isolated RS-232 interface for dedicated communications with a touch screen or a Serial Keno Panel. Channels 2 and 3 are fully isolated and can be configured using the CCB. Channel 1 is dedicated for communication with the bill acceptor.

Refer to the Machine Modes module of the Operator Manual for additional information.

The CCB plugs into the main board via a standard 72-pin SIMM socket and converts the opto coupled UART serial and I/O signals from the main board into the desired format for external connection. There are several different CCBs to configure the communications channels for signals to suit different markets.

CCB Part Number and Configuration

The following table shows the CCB part number and the associated configuration. The channel 2 and channel 3 communications signals are directed to a number of connectors on the backplane board.

PCBA Number	Channel 2	Channel 3
410748	RS-232	RS-232

RS-232 Interface

The RS-232 interface provides RS-232 communications between the main board and a peripheral device. The channel has six I/O signals, including data. This port can run at 9600-baud rate.

RS-232 Interface Signals, Channel 2

The following table provides the RS-232 interface signals, as configured on Channel 2.

PIN Name	Function	I/O	Description
SIN2:3	Tx	Input	Serial data input
SOUT2:3	Rx	Output	Serial data output
CTS2:3	Control	Input	Active low input
DSR2:3	Control	Input	Active low input
RTS2:3	Control	Output	Active low output
DTR2:3	Control	Output	Active low output

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CONNECTOR PIN ASSIGNMENT

The following table lists the input/output signals between the CCB and the main board.

PIN No	PIN Name	Description
1		Not used
2	GNDI	Ground
3	CFG4	OBS BNA channel
4		Not used
5	SINA1	SIN1 OBS BNA channel
6	CFG3	RTSA1 OBS channel pullup
7	SOUTA1	SOUT1 OBS BNA channel
8	CFG6	DTR1 OBS BNA channel
9	CTSA1	CTS1 OBS BNA channel
10	CFG5	OBS channel pullup
11	DSRA1	DSR1 OBS BNA channel
12	CFG8	OBS BNA channel input
13	CFG7	+12VI output
14	CFG10	OBS BNA channel
15	IA1	OBS BNA channel
16	CFG11	+12VI output
17	CFG9	+12VI output
18	CFG12	OBS BNA channel
19	RTSA1	Output to channel 1 connector. RTS1 OBS BNA channel
20	CFG13	+12VI output
21	DTRA1	RTS1 OBS BNA channel
22	CFG14	OBS BNA channel
23		Not used
24	P12VI	+ 12V power in
25	CFG20	GND
26	N12VI	Not used
27	CFG19	RTS2 TTL
28	GNDI	Ground.
29	CFG18	GND
30	CFG17	SOUT2 TTL
31	CFG16	SOUT2 OPTO BASE
32	CFG15	CCB VCC

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CONNECTOR PIN ASSIGNMENT (continued)

PIN No	PIN Name	Description
33	SIN2	RS-232 input from channel 2 connector
34	CFG22	GND
35	SOUT2	RS-232 output to channel 2 connector
36	CFG29	SIN2 TTL
37	CTS2	RS-232 input from channel 2 connector
38	CFG30	GND
39	DSR2	RS-232 input from channel 2 connector
40	CFG21	DTR2 TTL
41		Not used
42	CFG31	CCB VCC
43	RTS2	RS-232 output to channel 2 connector
44	CFG32	CTS2 TTL
45	DTR2	RS-232 output to channel 2 connector
46	CFG33	CCB VCC
47		Not used
48	P12VI	+ 12V power in
49	CFG34	DSR2 TTL
50	GNDI	Ground
51	CFG24	GND
52		Not used
53	SIN3	RS-232 input from channel 3 connector
54	CFG23	RTS3 TTL
55	SOUT3	RS-232 output to channel 3 connector
56	CFG26	GND
57	CFG25	DTR3 TTL
58	CFG28	GND
59	CTS3	RS-232 input from channel 3 connector
60	CFG27	SOUT3 TTL
61	CFG35	CCB VCC
62	CFG36	CTS2 TTL
63	DSR3	RS-232 input from channel 3 connector
64	CFG37	CCB VCC
65		Not used
66	CFG38	DSR3 TTL
67	RTSB1	RS-232 output to channel 3 connector

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CONNECTOR PIN ASSIGNMENT (continued)

PIN No	PIN Name	Description
68	CFG39	SIN3 TTL
69	DTRB1	RS-232 output to channel 3 connector
70	CFG40	GND
71		Not used
72	GNDI	Ground

GENERAL MAINTENANCE

Do not attempt component level repair without access to a workshop facility.

No maintenance is required. However, if a communications problem is experienced and a CCB error is suspected, the following operations may be performed:

Step	Description
1	Remove the CCB from the SIMM socket in the manner described in the CCB Removal section in the Cabinet, Door and Top Box module.
2	Ensure that all contacts on the CCB and in the SIMM socket on the main board are clean.
3	Inspect the contact area of the CCB. The board must not be thinner than 1.19mm. The contact end must be square (not cut, edged or grooved) and the contact metal must begin no more than 0.2mm from the square end. If any of these criteria is not met, discard the board.
4	Replace the CCB as described in the CCB Replacement section in the Cabinet, Door and Top Box module.

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Table of Contents

Overview 323

Machine Conditions 323

Operator Mode Menu Indicators 324

FutureLogic GEN2™ (PSA-66-ST2) Thermal Ticket Printer 325

Features 326

Interface Specifications 327

XON / XOFF Flow Control 327

Serial Communications PCB PIN-Outs 327

Ready/Busy Protocol 328

RS-232 DIP Switches 328

Printer Removal and Replacement 329

Loading Paper 330

Feeding Paper 331

Clearing a Paper Jam 332

Sensors 334

Paper Out 334

Paper Low 334

Paper Taken 334

Drawer Open 334

Printer Open 334

Troubleshooting 335

Self Test 335

Printer Status LEDs 336

Printer Errors 337

Specifications 338

Ithaca® Epic 950™ Thermal Ticket Printer ..339

Features 340

Interface Specifications 341

XON / XOFF Flow Control 341

Ready/Busy Protocol 342

Serial Communications PCB PIN-Outs 342

Printer Mechanism Assembly 343

Inner Chassis Removal 343

Inner Chassis Replacement 343

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Loading Tickets 344
Loading Tickets into the Ticket Supply Box 344
Feeding Tickets into the Printer Mechanism 344
Removing Loaded Tickets 345
Unloading Tickets by Opening the Ticket Cover 345
Unloading Tickets Using the FEED Button 345
Sensors 346
Cover Open Switch 346
Ticket Low Sensor 346
Ticket Burst Sensor 346
Top-of-Form/Ticket Out Sensor 346
Ticket Taken Sensor 346
Chassis Open Sensor/Audible Alarm 347
Care and Maintenance 348
Cleaning the Print Head 348
Troubleshooting 349
Self-test Ticket 349
Printing a Self-Test Ticket 349
Printer Status LEDs 350
Specifications 350
Custom Tickets 351

Ithaca® Model 850 Thermal Ticket Printer 352

Interface Specifications 353
XON / XOFF Flow Control 353
Ready/Busy Protocol 354
Serial Communications PCB PIN-Outs 354
Printer Mechanism Assembly 355
Printer Mechanism Assembly Removal 355
Tickets 356
Location and Access 356
Loading and Replacing Tickets 356
Replacing Tickets 357
Loading Tickets 357
Removing Loaded Tickets 358
Sensors 359
Paper Low 359
Top-of-Form Sensor 359
Ticket Taken Sensor 359
Head-Up Switch 359
Open/Close Position Sensor/Audible Alarm 360

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Care and Maintenance 361
Cleaning the Print Head 361
Troubleshooting 362
Printer Status LEDs 362
Specifications 363
Custom Tickets 363

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OVERVIEW

Location and Access

The printer is located above the main LCD monitor in the area provided for the Player Marketing Module (PMM) at the base of the top box. Access to the printer is through the top box.

Printer Location

Removal and replacement instructions are located in the Cabinet, Door and Top Box module.

MACHINE CONDITIONS

Printer configuration options in the electronic gaming machine (EGM) are found in the Operator Mode menu.

DEVICE DRIVER OPTIONS

BILL ACCEPTOR	ID003 (JCM)
TOUCH SCREEN	Micro Touch
COIN ENTRY	none
PRINTER	Ithaca
HOPPER	none

Play 10 Lines	—	Press to change driver
Service	—	Press to select next option
Cashout/TakeWin	—	Press to select previous option
Bet 3 Credits	—	Press to return to previous menu
Audit Key	—	Turn off to exit

"Lockup error to be acknowledged"

Device Driver Options

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Operator Mode Menu Indicators

Several Operator Mode menu displays provide printer information that addresses voucher in/out history, machine status, accounting, audit and statistics data, and error and lockup information. These menus are:

2. Accounting Information
2.1 Current Meters – Main
2.2 Periodic Meters – Main
2.9 Cash Information → Voucher In Meters
2.9 Cash Information → Voucher Out Meters
3. Diagnostic Information
3.1 Security Meters (Screen 1)
3.6 Voucher In Log
3.7 Ticket/Voucher Out Log
3.14 Printer Signature Log
4. Test/Diagnostics Mode
4.9 Printer Test
5. Operator Setup/Selections
5.1 Game Machine Options
5.1 Game Machine Options → Bill/Voucher Options
5.1 Game Machine Options → Device Driver Options
5.2 Jurisdictional Settings
6. Miscellaneous
6.2 Printer CRC Seed Setup
6.7 Print Audit Tickets
7. Current Lockup

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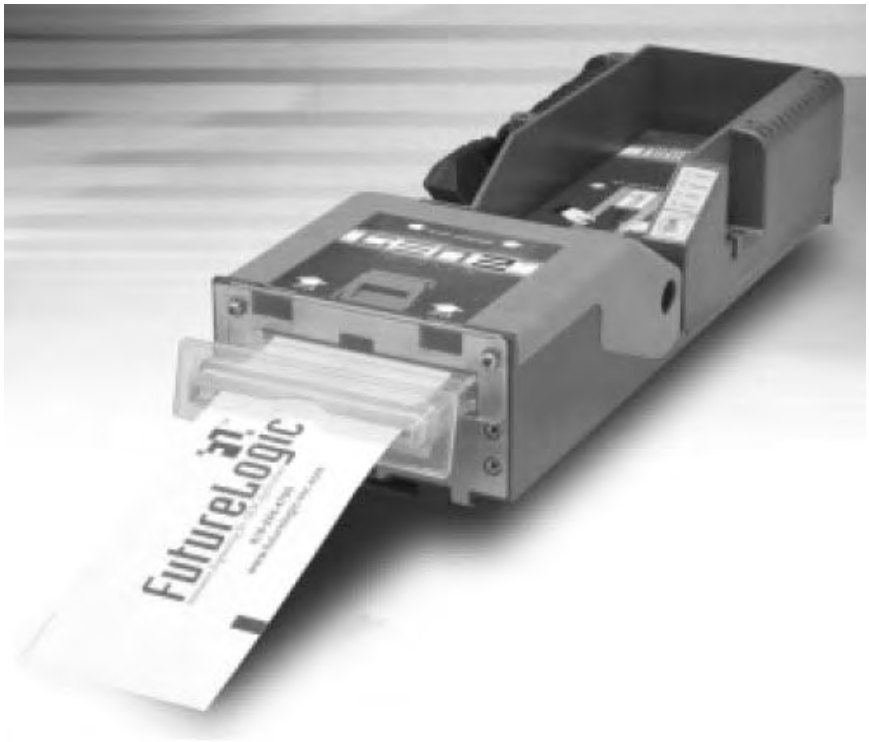
FUTURELOGIC GEN2™ (PSA-66-ST2) THERMAL TICKET PRINTER

The FutureLogic GEN2 Ticket Printer (GEN2) is an advanced thermal printer capable of creating high quality complicated output with a minimum of development and effort. The printer supports serial and Netplex current loop interface to allow operation in any EGM.



FutureLogic GEN2 Printer

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Features

Additional information is available from the FutureLogic Operators and Technicians Manual, or from the manufacturer's website at www.futurelogic-inc.com.

"GEN2" is a registered trademark of FutureLogic, Incorporated.

Features in the GEN2 include:

- Intelligent Ticket Handling (ITH™), which prevents player interference with any part of ticket production or presentation
- Angle or horizontal mounting of the unit
- Simple paper loading; no loose parts
- Variable paper capacity with different paper trays – 300, 600 and 900 ticket capacity trays
- Windows® ticket/receipt development package via the TCL Editor utility
- Promotional printing capabilities
- Page mode printing with TCL printer language
- Line printer capability
- High quality laser-like san serif fonts in multiple sizes
- Advanced graphics printing
- Windows® connectivity
- 3-inch per second print speed
- 4k input buffer – in line mode
- Wide temperature range operation
- Standard and customized serial interfaces available – RS-232 and Netplex

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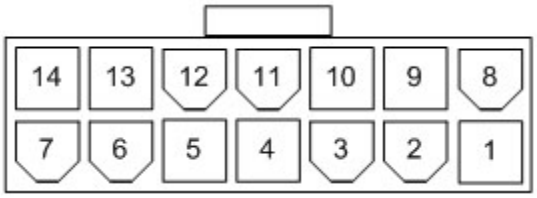
Interface Specifications

All power and communications are supplied through the Serial Communications printed circuit board (PCB) located at the rear of the printer. The interface connector is a 14 position Molex Minifit Jr® and will mate with Molex.



Serial Communications Connector

XON / XOFF Flow Control

The RS-232 serial interface communicates using hardware and XON (DC1)/XOFF (DC3) flow control. Flow control helps ensure that the computer does not send information to the printer faster than it can print.

XOFF

When the printer's buffer is approximately 50% full, it sends the ASCII code XOFF (13 Hex) to the computer to tell it to stop sending data. When there is room, the printer sends the ASCII code XON (11 Hex) to the computer to tell it to resume sending data. If the computer does not stop sending data after it receives an XOFF, the data that overflows the buffer is lost and the printer halts.

XON

The printer sends an XON code when it goes on-line to get things started. It will send an XOFF code to stop the computer from sending information if the input buffer is approximately 50%full.

Serial Communications PCB PIN-Outs

PIN #	Function	PIN #	Function
1	MRESET	8	+24VDC
2	Netplex TXD	9	Modulated +24VDC
3	+12 VDC (RS-232 optional)	10	GND
4	Netplex RXD	11	RS-232 RXD
5	GND	12	RS-232 TXD
6	+24VDC	13	DTR
7	GND	14	RTS

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Ready/Busy Protocol

The RS-232C interface uses the RTS/CTS, DTR/DSR, or XON/XOFF protocol. For RTS/CTS, changes in the RTS/CTS signal coordinate the information flow. For DTR/DSR, changes in the DTR/DSR signal coordinate the information flow. For XON/XOFF, data characters transmitted between the host computer control communication data flow.

RTS Protocol

The RTS signal controls data transmission to the printer. It is driven high when the printer is ready to receive data and driven low when it cannot accept any more data. The host transmits data to the printer when it recognizes the state of the printer's RTS signal is high.

DTR/DSR Protocol

The DTR signal controls data transmission to the printer. It is driven high when the printer is ready to receive data and driven low when it cannot accept any more data. The host transmits data to the printer when it recognizes the state of the printer's DTR signal is high.

RS-232 DIP Switches

The GEN2 has a set of six dual in-line package (DIP) switches accessible through a slot at the top of the printer. Use the DIP switches to select the communications protocol. These switches must be set according to the table below for proper operation.

RS-232 DIP Switches

Mode	SW1 (Jumper 3)	SW2 (Jumper 2)	SW3 (Jumper 1)	SW4 (Jumper 4)
9600	ON/0	ON/0	X	X
38400	OFF/1	ON/0	X	X
57600	OFF/1	ON/0	ON/0	X
XON/XOFF	X	X	X	OFF/1
RTS	X	X	X	ON/0

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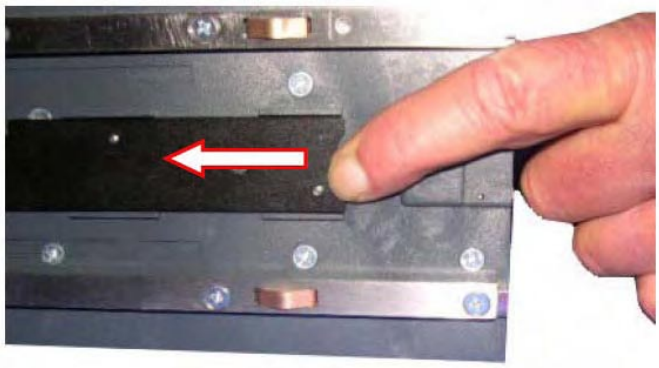
Printer Removal and Replacement

Electronic boards and their components are sensitive to static electricity. Exercise care during all handling operations and inspections of this product to ensure product integrity.
Do not handle this product out of its protective enclosure while it is not used for operations purposes unless it is otherwise protected.
Discharge clothing and tools prior to touching this assembly.
Whenever possible, unpack/pack this product only at EOS/ESD safe workstations. If an EOS/ESD safe workstation is not guaranteed, it is important that the operator is electrically discharged before touching this product with hands or tools.

Step	Description
1	Pull the printer out of the game until it locks.
2	Remove the paper from the printer.
3	Push the front locking bar unit to unlock the sliding module from the stationary module. Slide the drawer module completely out of the stationary module.
4	Push the release bar located on the bottom of the unit; while holding in the release bar, gently pull the printer forward. 

Reverse the above steps to replace the printer.

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Loading Paper

Use the automatic paper-loading feature to simplify this process to two steps: putting the paper stack into the paper tray and feeding the paper to the paper loading slot of the printer.

Step	Description
1	Pull open the printer drawer until the paper tray is completely accessible.
2	Place the paper stack in the printer as indicated by the bank around the stack and the label on the bottom of the paper tray.
3	Feed the paper into the paper-loading slot and release it once the motor engages and the printer grasps the paper. The printer automatically pulls through a form or two, and leaves it registered at the top of the form.
4	Remove the access tickets from the printer.

Loading Paper

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Feeding Paper

The GEN2 uses black mark indexed paper. Use the FEED button to feed paper into the GEN2. Press the FEED button to advance the paper to the top of the next form.

Feeding paper

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Clearing a Paper Jam

- Ensure that all paper paths from the entry path at the back of the paper well, through the printer, cutter, and the ticket module chute, are clear of paper or obstructions
- Use the platen release lever at the top of the unit

Step	Description
1	Remove the paper from the printer.
2	Open the lid by pressing the platen release lever. The spring-loaded lid opens, exposing the paper path.

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Clearing a Paper Jam (continued)

Step	Description
3	Remove the jammed ticket. If necessary, access the paper path through the print mechanism by opening the mechanism release lever.
4	Once clearing the jam, reverse these steps to restore the printer to a ready state.
5	Load the paper.

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Sensors

The GEN2 uses six primary sensors that work with the firmware to provide reliable trouble-free operation. Error conditions resulting from these sensors are indicated by the front bezel and keypad light emitting diodes (LED).

Paper Out

The Paper Out sensor, located in the print head, terminates print operation when the paper runs out and checks for proper form registration. The GEN2 ceases printing and feeding operations when it detects a paper out condition.

Paper Low

The Paper Low sensor, located in the paper well, determines when the paper stack has approximately 14 tickets remaining. The paper low status reports a paper low condition after the unit prints out 10 additional jobs. Check the true condition of the paper low status by recycling the power. A paper low condition automatically resets once a stack with a greater height is loaded. Paper low sensing occurs when the system is idle and takes a few seconds to detect the new paper level.

Paper Taken

The Paper Taken sensor, located in the chute of the GEN2 unit, determines when the customer takes a cashout ticket.

The GEN2 printer incorporates a TicketBurst™ feature, which automatically bursts tickets prior to presentation to the operator.

Drawer Open

The Drawer Open sensor, located in the paper well, detects when the printer platen is in use.

Printer Open

The Printer Open censor, located in the front of the unit, detects when the printer clamshell is open.

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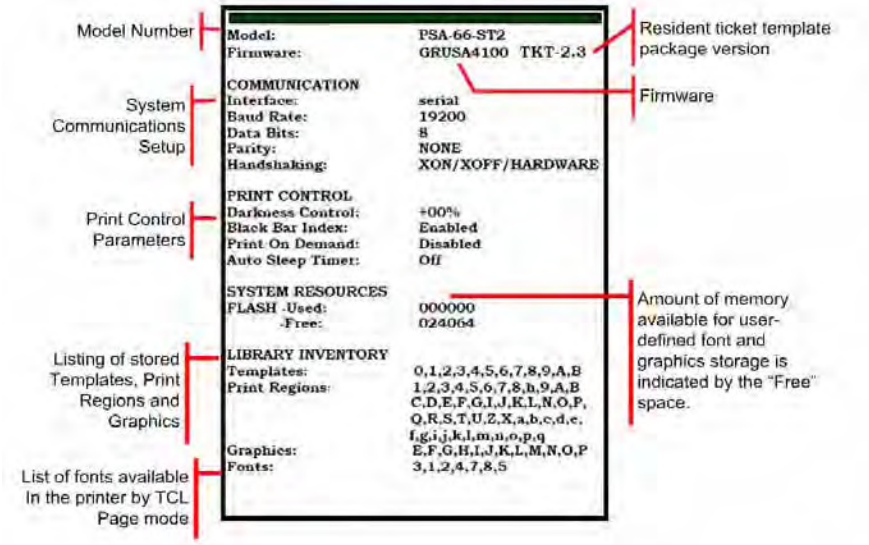
Troubleshooting

Troubleshooting incorporates a self-test, printer status LEDs, and printer error descriptions and their remedies.

Self Test

The self test contains important information on unit configuration. This test prints a configuration if the test passes successfully. Press the FEED button during power ON, or reset to run a self test.



Sample Configuration Ticket

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Printer Status LEDs

The keypad LEDs report the status of the printer whenever power is ON. Each condition of the keypad LEDs is detailed below.

Operator Indicators/Controls

Condition	LED			
	Ready	**Paper**	**Open**	**Fault**
Unit is powered OFF	OFF	OFF	OFF	OFF
Unit ready	Blink	OFF	OFF	OFF
Unit flushed	ON	ON	ON	ON
Paper out	OFF	ON	OFF	OFF
Head up or ticket module open	OFF	OFF	ON	OFF
Temperature error	OFF	OFF	OFF	ON
Voltage error	OFF	OFF	OFF	ON
Print head error	OFF	OFF	OFF	ON
Missing black index mark	OFF	ON	OFF	OFF
Paper is jammed	ON	OFF	OFF	Blink

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Printer Errors

Most printer errors result from the printer running out of paper, or the operator opening the module lid. The following table details the possible errors and remedies for each condition.

Error	Description	Remedy
Paper out	The printer does not detect paper present.	Load a new paper stack.
Head up or open	Results from opening the head release lever, or opening the ticket module lid.	Raise the blue lever on the side of the unit.
Temperature	The printer is in an over temperature condition.	The printer automatically resumes operation after the detected head temperature reaches legal operation limits.
Voltage	The printer detects a power supply voltage outside the legal limits.	The printer automatically resumes operation after the power supply is detected within legal limits.
Print head	The printer senses an internal error due to connectivity or interfacing problem with the thermal print head.	The printer remains in this error state until the power is cycled or the unit is reset. If the problem persists, contact the manufacturer.
Missing black index mark	The paper type selected is indexed paper and, while feeding paper or printing, a black mark is not seen within approximately 10-inches of the paper.	Raise the head release lever (to change the paper).
Paper jam	The printer detects an error in the paper path for presenting the ticket.	Open the printer and inspect for a jammed ticket.

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Specifications

Feature	Specification
Print Speed	90 mm/sec. (3.5” per sec.)
Print Resolution	8 dots/mm (203dpi)
Printing Method	Direct thermal, top coated, fanfolded and perforated
Print head life	50km minimum (320,000 tickets based on US currency size)
Power Requirement	24V DC @ 2.7A avg. (4.0A peak with 60% gaming ticket)
Ticket Dimensions	65mm x 156mm
Interface/Communications Protocol	RS232C bi-directional full handshaking set Netplex USB with separate USB download port. A second serial port is available in RS232C and other three- and four-wire interfaces
Printer Depth	304.8mm
Weight	2.7 lbs.

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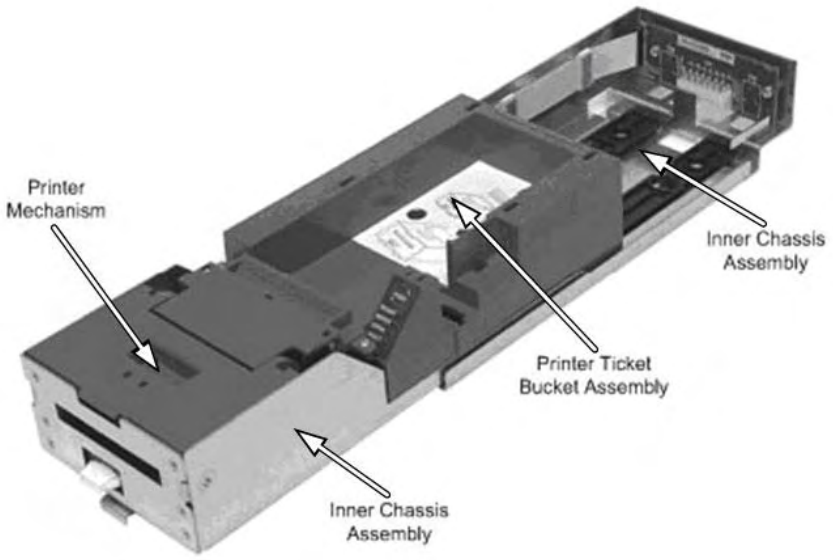
ITHACA® EPIC 950™ THERMAL TICKET PRINTER

The Ithaca Epic 950 Ticket Printer (Epic 950) features full backward compatibility for previous users of Ithaca Series 800 printers, together with a host of new features that improves the performance of gaming operations.

The Epic 950 is designed for ease of programming and ease of use in gaming operations. While supporting the full command language and macro features of the Series 800 printer, the Epic 950 introduces a new higher-level command interface which lets the operator quickly and easily integrate more layout and printing options than ever.



Ithaca Epic 950 Printer

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Features

Additional information is available from the Epic 950 OEM Integration Manual (P/N 95-05245), or from the manufacturer's website at www.transact-tech.com.

"Ithaca" is a registered trademark of TransAct Technologies.

Features include:

- Perforated fan folded tickets in a stack of 200, 300 or 400 tickets
- Barcode and total ticket cash-out capabilities
- TicketBurst – incorporating print, burst and transport zones, where the ticket is completely printed and burst before transport to operator
- HotSwap QDT (Quick Disconnect Technology), a hot swappable printer mechanism design for easy service
- Modular interface printed circuit board (PCB)
- Selections of 7.5, 10, 12, 16.5 and 20 characters per inch printing
- Selectable printing of normal, double-high, double-wide and double-high/double-wide
- Sensors for Burst Ticket, Ticket Low, Top-of-Form/Ticket Out, Chassis Open, and Ticket Taken
- Cover Open switch
- Modular printer mechanism, ticket tray and sliding unit for easy maintenance
- Open ticket path for ticket jam clearing
- Operator interface: FEED button, status LED's (Ready/Paper/Open/Fault)
- Bezel lamp connection import firmware and graphics download port
- Print face down
- Page mode printing
- Audible Buzzer

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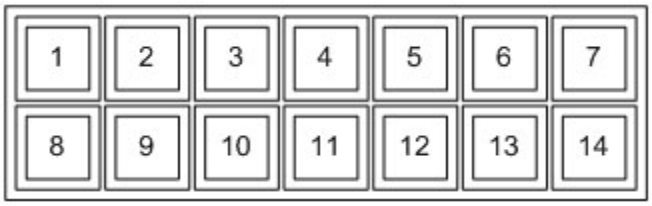
Interface Specifications

All power and communications are supplied through the Serial Communications printed circuit board (PCB) located at the rear of the printer. The interface connector is a 14 position Molex Minifit Jr® and will mate with Molex.



Serial Communications Connector

XON / XOFF Flow Control

The RS-232 serial interface communicates using hardware and XON (DC1)/XOFF (DC3) flow control. Flow control helps ensure that the computer does not send information to the printer faster than it can print.

XOFF

When the printer's buffer is approximately 50% full, it sends the ASCII code XOFF (13 Hex) to the computer to tell it to stop sending data. When there is room, the printer sends the ASCII code XON (11 Hex) to the computer to tell it to resume sending data. If the computer does not stop sending data after it receives an XOFF, the data that overflows the buffer is lost and the printer halts.

XON

The printer sends an XON code when it goes on-line to get things started. It will send an XOFF code to stop the computer from sending information if the input buffer is approximately 50%full.

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Ready/Busy Protocol

The RS-232C interface uses the RTS/CTS, DTR/DSR, or XON/XOFF protocol. For RTS/CTS, changes in the RTS/CTS signal coordinate the information flow. For DTR/DSR, changes in the DTR/DSR signal coordinate the information flow. For XON/XOFF, data characters transmitted between the host computer control communication data flow.

The RS-232C version of the Epic 950 offers the standard communication options configured in the flash.

RTS/CTS Protocol

The RTS signal controls data transmission to the printer. It is driven high when the printer is ready to receive data and driven low when it cannot accept any more data. The host transmits data to the printer when it recognizes the state of the printer's RTS signal is high.

DTR/DSR Protocol

The DTR signal controls data transmission to the printer. It is driven high when the printer is ready to receive data and driven low when it cannot accept any more data. The host transmits data to the printer when it recognizes the state of the printer's DTR signal is high.

Serial Communications PCB PIN-Outs

PIN #	Function	I/O
1	MRESET	I
2	Not connected	N/C
3	+12 VDC	I
4	Not connected	N/C
5	GND	--
6	+24VDC	--
7	GND	--
8	+24VDC	--
9	Bezel Lamp – Switched +24VDC	O
10	GND	--
11	RS-232 RXD	I
12	RS-232 TXD	O
13	DTR	O
14	RTS	O

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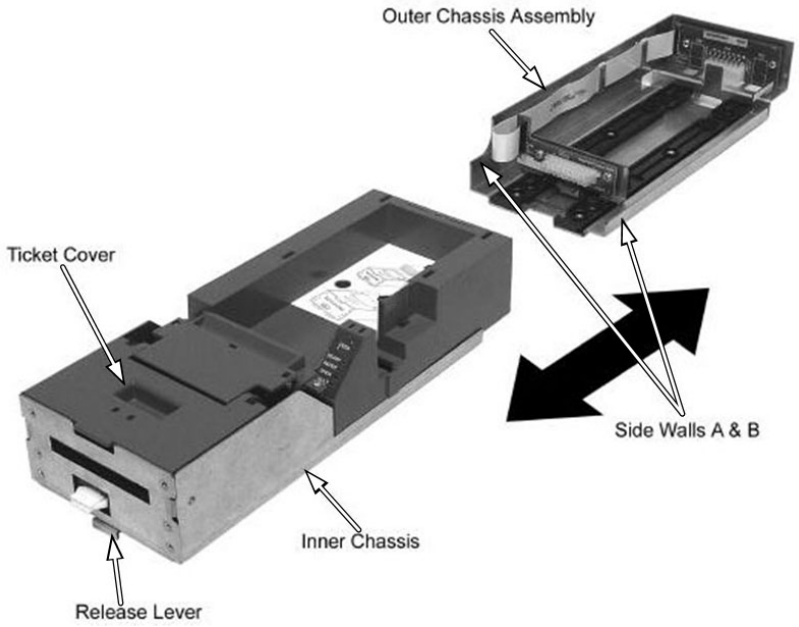
Printer Mechanism Assembly

The Epic 950 uses a slider/detent/latch system with latch arms to retain the inner chassis from accidentally separating from the outer chassis. The Epic 950 opens for service by pulling on the ticket cover and pulling the inner chassis forward from the outer chassis much like a filing cabinet. If accessible, a front-mounted release lever can be pulled to disengage and slide the inner chassis.



Printer Assembly Components

Inner Chassis Removal

Step	Description
1	Pull on the ticket cover to release the rear detents, pulling the inner chassis forward until its latches catch the forward detent slots in the outer chassis slides.
2	Pull on the release lever and pull forward on the inner chassis to disconnect from the outer chassis.

Inner Chassis Replacement

Step	Description
1	Align the base of the inner chassis with the outer walls of the outer chassis, seating it within the sidewalls.
2	While pulling outwards on the release lever, slide the inner chassis towards the rear of the outer chassis until it latches at the rear of the outer chassis.

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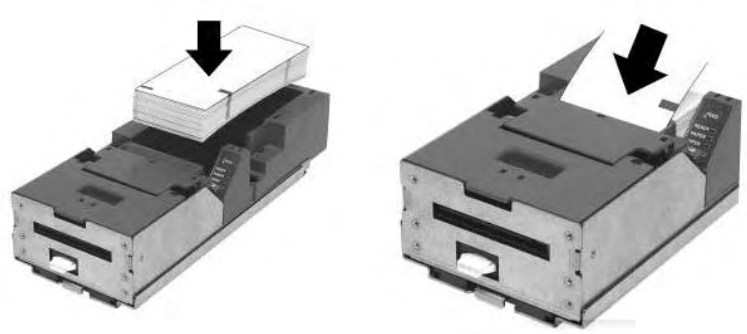
Loading Tickets

When loading new ticket stacks, ensure there is power to the printer. Insert the first ticket of the stack into the printer by hand. The Epic 950's ticket tray is integrated with a guide to direct the ticket into the printer mechanism. Once the leading ticket enters the top of form sensor, the ticket automatically feeds into the printer mechanism.

Loading Tickets into the Ticket Supply Box

Step	Description
1	Load tickets into the ticket supply tray, ensuring that the black dot is positioned as shown below. 
2	Orient the tickets so that the black dot is towards the leading edge of the ticket.

Feeding Tickets into the Printer Mechanism

Step	Description
1	Place the tickets in the ticket tray with the proper black dot orientation.
2	Insert the leading ticket into the printer mechanism's insertion guide area. Feed the ticket about a ½" into the mechanism; the machine automatically completes the feeding process.
3	If printer slid out from the rack, ensure that the printer is closed. The printer is ready to receive information.

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Removing Loaded Tickets

There are two ways to remove unused tickets from the printer mechanism assembly:

- Lift and rotate the ticket cover backwards; this relieves pressure to the platen allowing ticket removal, and allows an opening that provides space to check the printer for ticket jams, or prepare the paper path for ticket replenishing.
- Use the FEED button, which feeds out tickets from within the printer mechanism.

Unloading Tickets by Opening the Ticket Cover

Step	Description
1	Pull the inner chassis away from the outer chassis until it stops in the open position.
2	Lift and rotate the ticket cover backwards, towards the rear of the printer.
3	Remove all tickets from the ticket path and check for any debris.
4	Remove any remaining tickets from the ticket tray.
5	Rotate the ticket cover into its original closed and latched (magnetic) position. Proceed with the ticket loading procedure.

Unloading Tickets Using the FEED Button

Step	Description
1	Pull the printer mechanism assembly out of the slide chassis until it stops in the open position.
2	Separate the ticket currently loaded in the platen assembly from the ticket bundle.
3	Press the FEED button to eject the ticket.
4	Remove any remaining tickets from the ticket supply box. Proceed with the ticket loading procedure.

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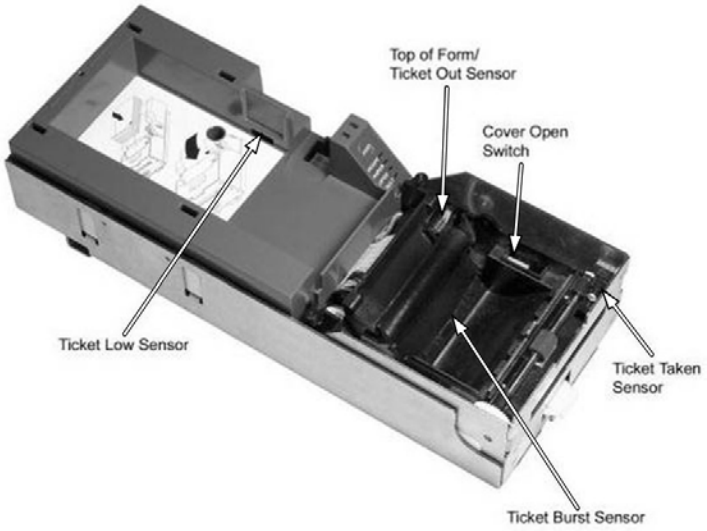
Sensors

The Epic 950 uses several sensors to provide feedback to the host system. All power and interface communications are handled by the communications PCB.



Sensor Locations

Cover Open Switch

The Cover Open switch detects when the ticket cover is open, and halts printing and the ticket feeding process until the ticket cover is closed.

Ticket Low Sensor

A Ticket Low sensor optically senses the number of tickets remaining in the printer's ticket bucket. The sensor detects when the number of tickets reaches below 5-10 tickets. The ticket low status is reported on the status byte, when the host issues a status request.

Ticket Burst Sensor

The Epic 950 printer incorporates a TicketBurst feature, which automatically bursts tickets prior to presentation to the operator. The Ticket Burst sensor detects that the ticket was separated before it was presented.

Top-of-Form/Ticket Out Sensor

A Top Of Form/Ticket Out sensor controls ticket loading and printing.

Ticket Taken Sensor

A Ticket Taken sensor determines when customers take the printed ticket.

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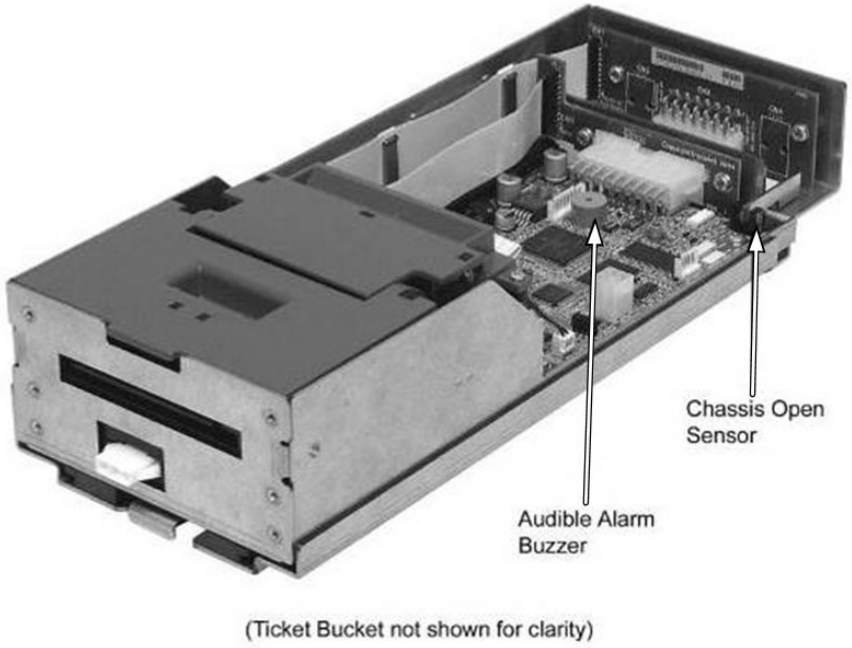
Chassis Open Sensor/ Audible Alarm

The Chassis Open sensor determines if the inner chassis is in the full-racked position. If the inner chassis is not in the fully racked position, the printer status LED blinks, indicating the printer is not ready.



Audible Alarm Sensor

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Care and Maintenance

Cleaning the Print Head

There is no set schedule for printer maintenance. Perform appropriate maintenance as required.

Use a soft brush to clean the paper dust from inside the printer and chassis area. Remove paper dust from the sensor optics.

If streaking on the printed ticket is evident, the thermal print head requires cleaning. Insert a thermal-printer cleaning card into the printer channel past the print head.

Cleaning Cards are available through Transact, or can be purchased direct from Enefco International Ltd at (888) 578-0141:

- 2.5” x 6” thermal cleaning card (box of 25)
- Transact Part Number 100-03322, Enefco Part Number GTP250PB

Step	Description
1	Open the cover and remove all tickets from the ticket feed path; close the cover.
2	Open the cleaning card pouch and remove the cleaning card; insert the cleaning card into the feed path. The cleaning card automatically draws into the feed path.
3	Open the cover and remove the cleaning card by gently pulling it back. Repeat if necessary.
4	Properly dispose the used cleaning card.

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Troubleshooting

Troubleshooting incorporates a self-test, printer status LEDs, and printer error descriptions and their remedies.

Self-test Ticket

The Epic 950 can print a pre-defined self-test ticket, to test the normal printing functionality of the unit, and create a printout of the current printer configuration.

Printers may print more or less information, depending on the version and revision of the printer.

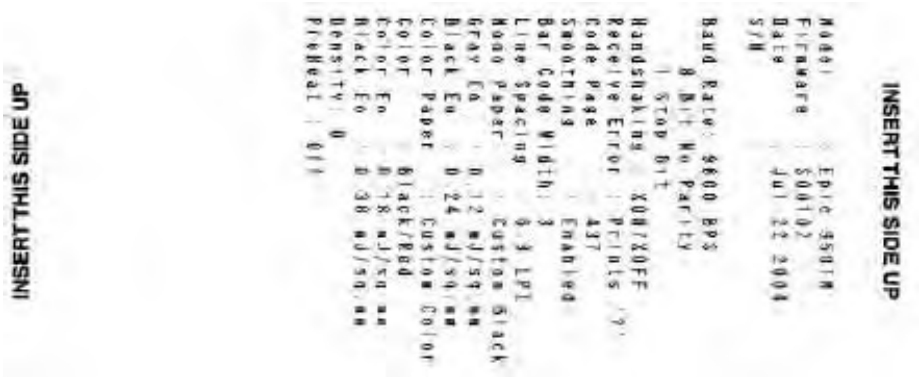
If the printer is not performing correctly, check that the unit is receiving power. The green test LED should be ON when the printer is correctly receiving power. After confirming that the printer is receiving power, check that the ticket was loaded correctly and is not jammed in the ticket path.

Printing a Self-Test Ticket

Step	Description
1	Unrack the inner chassis.
2	Open the ticket cover. Do NOT remove a currently loaded ticket.
3	Press and hold the FEED button until the Open LED goes out, then release this button.
4	Close the ticket cover; the self-test ticket automatically prints.
5	Close the inner chassis to resume normal operation.

Press the ticket FEED button to advance a single ticket through the print mechanism and automatically position the ticket correctly. Ensure all connectors are firmly in place to ensure a proper signal.

If the printer continues to feed tickets without stopping, check that the tickets are facing in the right direction to allow the sensor to detect the alignment marks at the top of the ticket.



Sample Text Ticket

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Printer Status LEDs

The printer is outfitted with a light emitting diode (LED) indicator system that provides the condition of the printer by using a series of blinks to communicate the status of the printer. The following lists the different LED indications and provides a brief description.

Condition	LED			
	Ready	Paper	Open	Fault
Unit ready	ON	OFF	OFF	OFF
Cover open	ON	OFF	ON	OFF
Chassis open	ON	OFF	Blink	OFF
Ticket out	ON	ON	OFF	OFF
Ticket low	ON	Blink	OFF	OFF
Temperature error	Blink	OFF	OFF	Blink
Paper jam	ON	OFF	OFF	Blink
RAM error	2 Blinks	OFF	OFF	ON
Checksum error	4 Blinks	OFF	OFF	ON

Specifications

Feature	Specification
Print Speed	125 mm/sec. (5” per sec.) max. (monochrome) (in text mode)
Print Resolution	203dpi x 203dpi
Printing Method	Fixed linear thermal head
Power Requirement	24V DC ±10% 2.2 Amps max.
Ticket Dimensions	65mm x 156mm
Interface	RS-232 bi-directional XON/XOFF
Communications Protocol	9600 baud, 8 data bits, no parity, 1 start bit, 1 stop bit
Bezel Dimensions	139mm x 85mm
Printer Depth	284mm
Weight	3.8 lbs.

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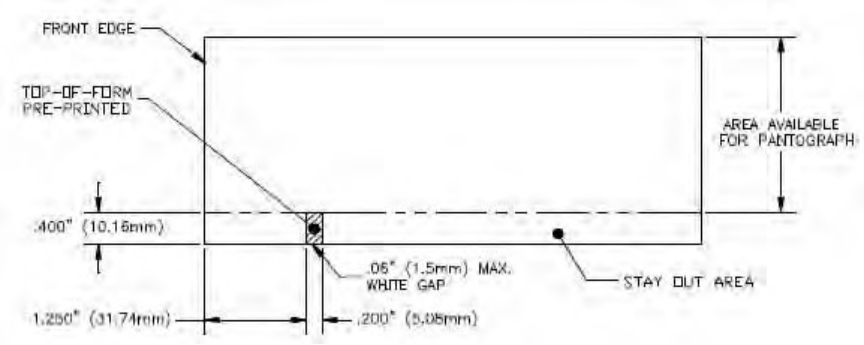
Custom Tickets

The Ithaca Printer uses the thermal printing method. To use custom pre-printed tickets, all graphics must be compatible with thermal ink. The underside of the ticket contains indexing marks that must be clear of any graphics and disclaimer notices.

The marks must be printed in black, thermal-paper-compatible, be in infrared ink, and printed with a McBeth Densitometer reading of 1.5 to 0.3. The indicator must be 3mm by 8mm and located at a distance of 3.5mm from the right side and 6mm from the top of the ticket back. The 11.5mm area in line with the black-dot / top-of-form indicator and the ticket edge must remain clear, as the ticket-out sensor reads that area while the ticket is printed and presented.



Custom Tickets

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ITHACA® MODEL 850 THERMAL TICKET PRINTER

Additional information is available from the Model 850 OEM Integration Manual (P/N 85-03431), or from the manufacturer's website at www.transact-tech.com.

"Ithaca" is a registered trademark of TransAct Technologies.

The Ithaca Model 850 Thermal Ticket Printer (Ithaca 850) is a high-quality, high-speed (5ips) output device that provides printing of portrait and landscape text, graphics and lines. The device is used to output cash tickets that can be read by the bill acceptor.

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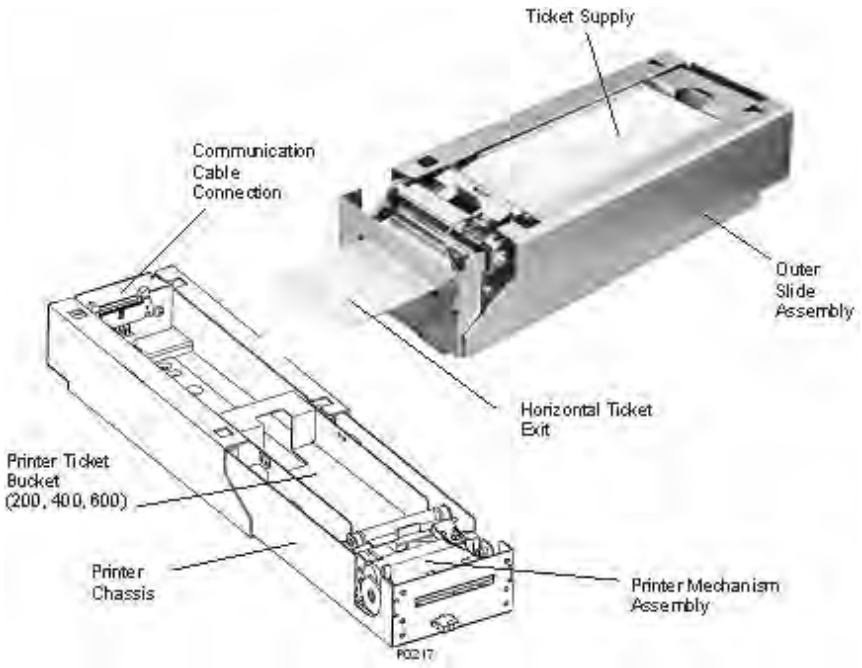

Printer Components

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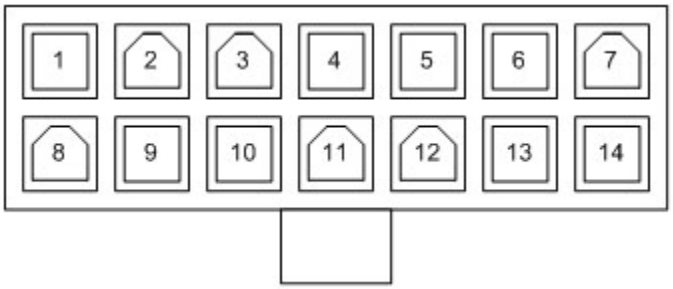
Interface Specifications

All power and communications are supplied through the Serial Communications printed circuit board (PCB) located at the rear of the printer. The interface connector is a 14 position Molex Minifit Jr® and will mate with Molex.



Serial Communications Connector

XON / XOFF Flow Control

The RS-232 serial interface communicates using hardware and XON (DC1)/XOFF (DC3) flow control. Flow control helps ensure that the computer does not send information to the printer faster than it can print.

XOFF

When the printer's buffer is approximately 50% full, it sends the ASCII code XOFF (13 Hex) to the computer to tell it to stop sending data. When there is room, the printer sends the ASCII code XON (11 Hex) to the computer to tell it to resume sending data. If the computer does not stop sending data after it receives an XOFF, the data that overflows the buffer is lost and the printer halts.

XON

The printer sends an XON code when it goes on-line to get things started. It will send an XOFF code to stop the computer from sending information if the input buffer is approximately 50%full.

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Ready/Busy Protocol

The RS-232C interface uses the RTS/CTS, DTR/DSR, or XON/XOFF protocol. For RTS/CTS, changes in the RTS/CTS signal coordinate the information flow. For DTR/DSR, changes in the DTR/DSR signal coordinate the information flow. For XON/XOFF, data characters transmitted between the host computer control communication data flow.

The RS-232C version of the Ithaca 850 offers the standard communication options configured in flash.

RTS/CTS Protocol

The RTS signal controls data transmission to the printer. It is driven high when the printer is ready to receive data and driven low when it cannot accept any more data. The host transmits data to the printer when it recognizes the state of the printer's RTS signal is high.

DTR/DSR Protocol

The DTR signal controls data transmission to the printer. It is driven high when the printer is ready to receive data and driven low when it cannot accept any more data. The host transmits data to the printer when it recognizes the state of the printer's DTR signal is high.

Serial Communications PCB PIN-Outs

PIN #	Function	Description	I/O
1	MRESET	Active Low Signal – Optically Isolated Vin(H) 13 VDC Vin(L) 0.3 – 1.2 V @ 15 ma	I
2	Not connected		N/C
3	+12 VDC	VRESET 13VCD 150ma NOM	I
4	Not connected		N/C
5	GND	Printer ground	–
6	+24VDC	Printer voltage	–
7	GND	Printer ground	–
8	+24VDC	Printer voltage	–
9	Modulated +24VDC	Bezel lamp power	O
10	GND	Printer frame	–
11	RS-232 RXD	Printer receive	I
12	RS-232 TXD	Printer transmit	O
13	DTR		O
14	RTS		O

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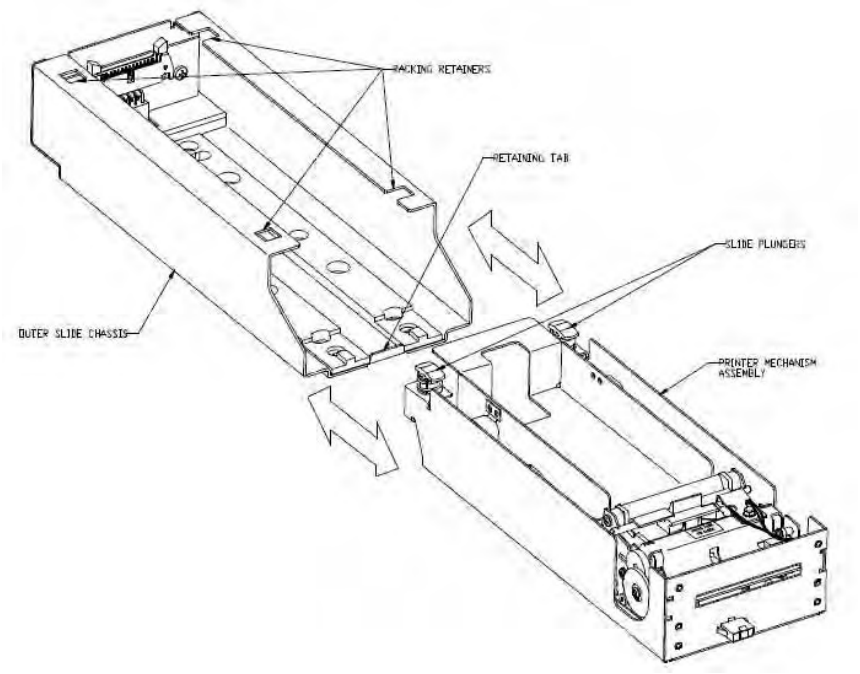
Printer Mechanism Assembly

The Ithaca 850 uses a slider/detent system with springs to retain the printer mechanism assembly from accidentally separating from the outer chassis. The Ithaca 850 opens for service by pulling the printer mechanism assembly out of the outer chassis much like a filing cabinet.



Printer Assembly Components

Printer Mechanism Assembly Removal

Step	Description
1	Pull the printer mechanism assembly forward until the slide plungers fit into the front racking retainers (detents) of the outer slide chassis.
2	Lift the front end of the printer mechanism assembly up until it is free of the retaining tab located on the front, inside area of the outer chassis.

If the printer mechanism assembly is removed from the outer slide chassis, the 30-pin cable joining the printer serial communication board and the printer's main controller board must be disconnected.

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Tickets

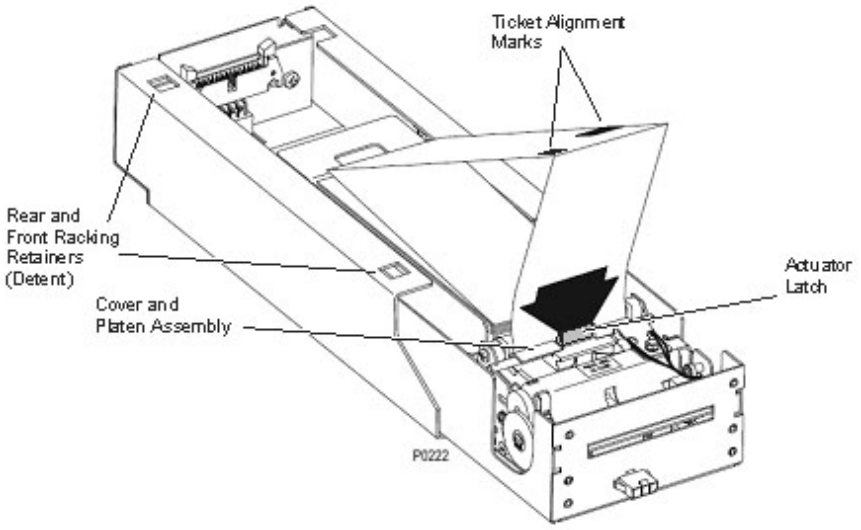
The ticket medium is a stack of 200 tickets in a perforated fan fold configuration located in a ticket bucket at the rear of the printer. The ticket is not made available to the player until it is completely printed and the customer performs the ticket separation. Tickets have alignment marks printed on the underside to enable feeding of the tickets to the correct printing position.

Location and Access

The ticket bucket is situated to the rear of the printer mechanism assembly. The printer mechanism assembly uses a slider/detent system with springs to retain the printer mechanism assembly from accidentally being separated from the printer chassis. Remove the printer mechanism assembly from the outer slide assembly until it is held by the front racking retainers.

Loading and Replacing Tickets

To ensure the ticket is loaded correctly into the printer, the ticket stack must be properly loaded in the ticket box. The stack must be oriented so that the black dot/top of form mark of the tickets is on the leading edge of the ticket, not near the perforation of the next ticket. If the top ticket on the stack has the back facing upward, the perforation attaching the next ticket will be toward the front of the ticket supply box with the black dot/top of form indicator in the rear right corner. If the print area is facing upward, the perforation attaching the next ticket will be toward the rear of the ticket supply box.



Loading Tickets Feeding Mechanism

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Replacing Tickets

Step	Description
1	Pull the printer forward to the extended position until the plastic slide plungers fit into the front racking retainers (detents) of the outer slide chassis.
2	Push the drawer into the outer slide assembly until the plastic slide plungers fit into the rear racking retainers (detents) of the outer slide assembly.
3	Insert the first ticket of a new stack into the printer feed mechanism by hand. A guide directs the ticket into the mechanism.

Loading Tickets

The following procedure requires the power to remain ON.

Step	Description
1	Remove the printer as previously described.
2	Grasp the first ticket and insert it between the cover-platen assembly and the print head until the ticket reaches the printer mechanism (about 12mm).
3	Continue to push gently until the printer mechanism detects the ticket and the motor pulls it into the printer channel. The printer stops feeding automatically upon sensing the alignment marks.
4	Replace the printer as previously described.

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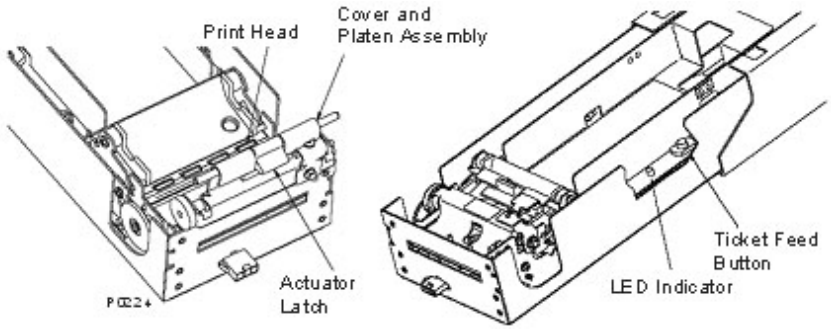
Removing Loaded Tickets

There are two ways to remove unused tickets from the printer mechanism assembly:

- Press the FEED button
- Release the plastic actuator latch to open the cover and platen assembly



Feed Button and Actuator Latch

Unloading Tickets Using the FEED Button

Step	Description
1	Pull the printer mechanism assembly out of the slide chassis until it stops in the open position.
2	Separate the ticket currently loaded in the platen assembly from the ticket bundle.
3	Press the FEED button to eject the ticket.
4	Remove any remaining tickets from the ticket supply box and proceed with the ticket loading procedure.

Unloading Tickets by Opening the Platen Assembly

Step	Description
1	Pull the printer mechanism assembly out of the slide chassis until it stops in the open position.
2	Pull the plastic actuator latch towards the front of the printer.
3	Swing the platen assembly up and towards the front of the printer.
4	Remove all tickets from the ticket path and check for any debris.
5	Press the green label to re-latch the platen assembly and proceed with the ticket loading procedure.

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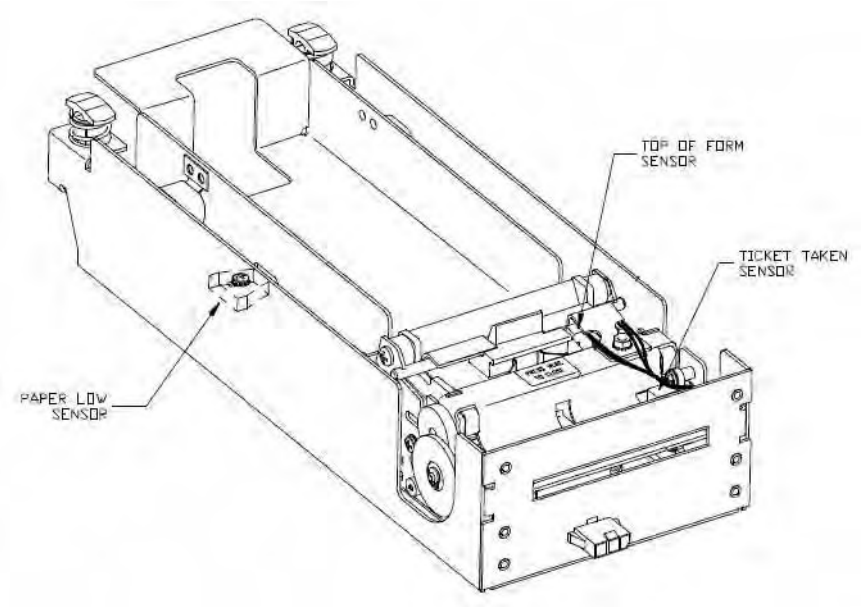
Sensors

The Ithaca 850 printer uses several sensors to provide feedback to the host system. All power and interface communications are handled by the communications printed circuit board (PCB).



Sensor Locations

Paper Low

The Paper Low sensor optically senses the number of tickets remaining in the printer's ticket bucket. The sensor detects when the number of tickets reaches below 30 to 35 tickets. The paper low status reports on the status byte, when the host issues a status requested.

Top-of-Form Sensor

A Top of Form sensor controls ticket loading and printing.

Ticket Taken Sensor

A Ticket Taken sensor determines when customers actually take the printed ticket.

Head-Up Switch

A Head Up Switch signals when the thermal printhead assembly is open. The Head Up Switch is located under the printhead and is not visible from the top view.

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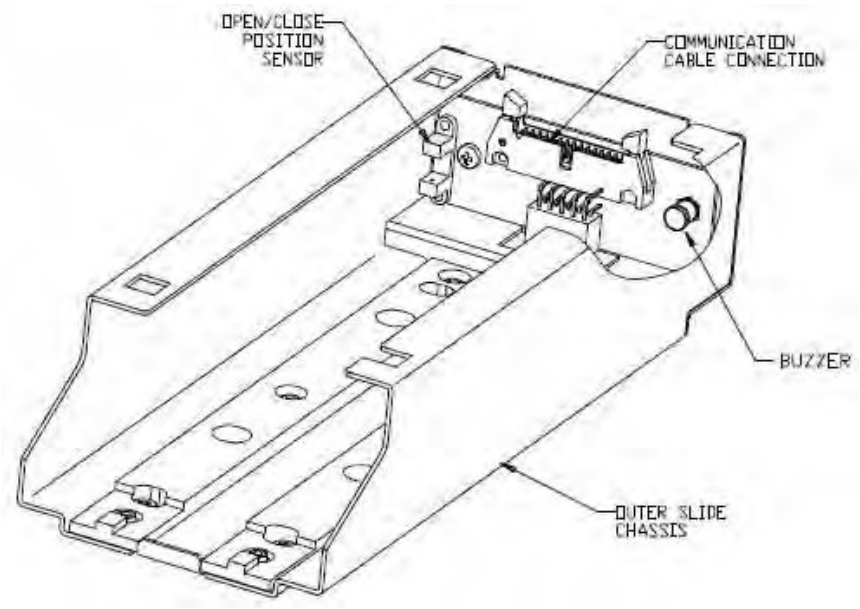
Open/Close Position Sensor/Audible Alarm

The Open/Close Position sensor determines if the printer mechanism assembly is in the full-racked position. If the printer mechanism assembly is not in the fully racked position, the printer status LED blinks which indicates the printer is not ready.



Open/Close Position Sensor

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Care and Maintenance

Cleaning the Print Head

There is no set schedule for printer maintenance. Perform appropriate maintenance as required.

If streaking on the printed ticket is evident, the thermal print head require cleaning. Insert a thermal-printer cleaning card into the printer channel past the print head.

Cleaning Cards are available through Transact, or can be purchased direct from Enefco International Ltd at (888) 578-0141:

- 2.5” x 6” thermal cleaning card (box of 25)
- Transact Part Number 100-03322, Enefco Part Number GTP250PB.

Step	Description
1	Remove all tickets from the ticket feed path.
2	Obtain a new cleaning card package, open the container pouch and remove the cleaning card. Insert the cleaning card into the ticket feed path.
3	Press and hold the FEED button when the cleaning card is drawn into the feed path.
4	Release the FEED button when the cleaning card protrudes from the bezel mouth.
5	Repeat the process if evidence of the streaking remains. Properly dispose of the used cleaning card.

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Troubleshooting

If the printer is not performing correctly, check that the unit is receiving power. The green test LED should be ON when the printer is correctly receiving power. After confirming that the printer is receiving power, check that the ticket was loaded correctly and is not jammed in the ticket path.

Press the ticket FEED button to advance a single ticket through the print mechanism and automatically position the ticket correctly. Ensure all connectors are firmly in place to ensure a proper signal.

If the printer continues to feed tickets without stopping, check that the tickets are facing in the right direction to allow the sensor to detect the alignment marks at the top of the ticket.

Printer Status LEDs

The printer has an LED indicator system that provides the condition of the printer by using a series of blinks to communicate the status of the printer. The following table lists the different LED indications and provides a brief description.

Condition	Status LED
Unit ready	On
Head up	Medium blink
Printer Mechanism Assembly is Open	Medium blink
Paper Out	Slow blink
Temperature Error	Fast blink
Paper Jam	4 Blinks pause
RAM error	2 Blinks pause
Checksum Error	5 Blinks pause

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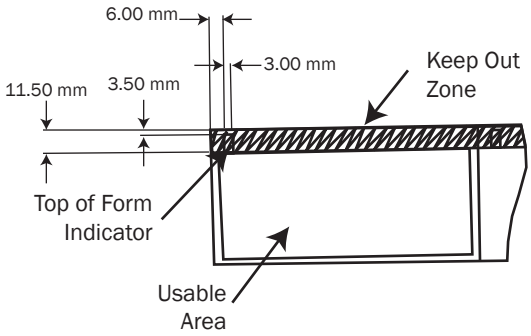
Specifications

Feature	Specification
Print Speed	51mm/sec
Print Resolution	8 dots per mm horizontal and vertical
Printing Method	Direct Thermal
Print head life	25km
Data Buffer	4kb
Power Requirement	24V DC ±10% 1.5A max.
Ticket Dimensions	65mm x 156mm
Ticket Stack	58mm
Interface	RS-232 bi-directional XON/XOFF
Communications Protocol	9600 baud, 8 data bits, no parity, 1 start bit, 1 stop bit
Bezel Dimensions	139mm x 85mm
Printer Depth	325mm
Weight	3.41kg

Custom Tickets

The Ithaca Printer uses the thermal printing method. To use custom pre-printed tickets, all graphics must be compatible with thermal ink. The underside of the ticket contains indexing marks that must be clear of any graphics and disclaimer notices.

The marks must be printed in black, thermal-paper-compatible, be in infrared ink, and printed with a McBeth Densitometer reading of 1.5 to 0.3. The indicator must be 3mm by 8mm and located at a distance of 3.5mm from the right side and 6mm from the top of the ticket back. The 11.5mm area in line with the black-dot / top-of-form indicator and the ticket edge must remain clear, as the ticket-out sensor reads that area while the ticket is printed and presented.



Custom Tickets

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Table of Contents

General Description.....365

Technical Description 366

Meters Interface 367
Overcurrent Protection.....367
Light Tower Driver & Belly Panel Door Security Interfaces.....367
Meter Detection.....367
Electromechanical Meters 367

Structure and Components 368

Connector PIN Assignments.....370

Connection from Backplane Board.....370
Connection to Pulse Interface Board.....371
Backplane Connections to Pulse Interface Board.....371
Connection to Light Tower Lamps.....372

General Maintenance.....373

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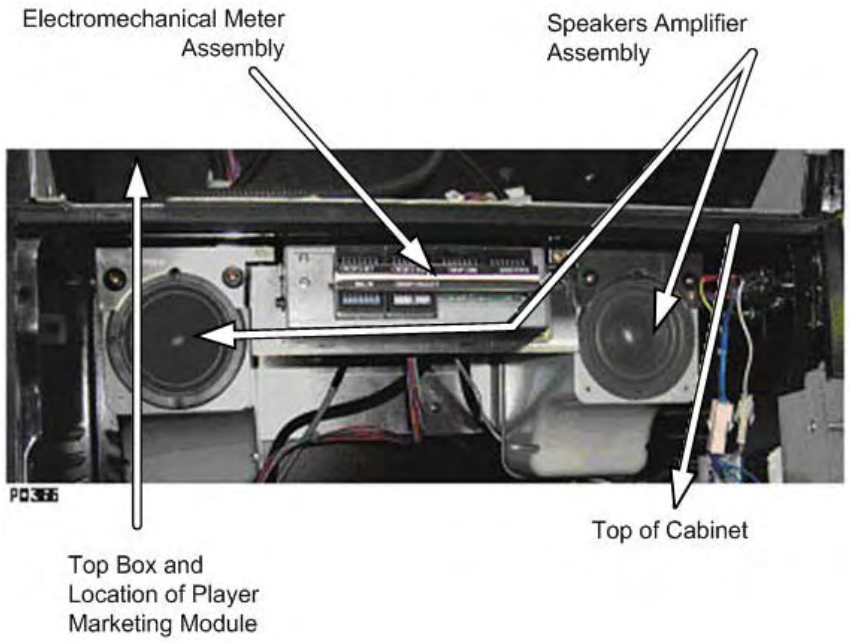
GENERAL DESCRIPTION

Removal and replacement instructions are located in the Cabinet, Door and Top Box module.

The hard meters board assembly, attached to the underside of the player marketing module (PMM) tray, provides six electromechanical meters that can be viewed through the main door viewing window when the audit key switch is turned counter-clockwise. The meters record activity counts as required by jurisdictional authorities.



Electromechanical Meters – Location

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TECHNICAL DESCRIPTION

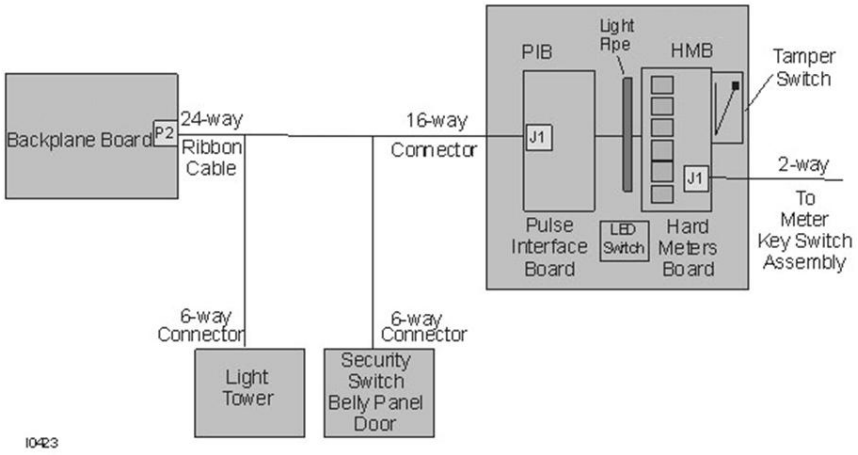
The hard meters board assembly includes:

- A metering board, the hard meter board (HMB), with the capability to handle up to eight pulse inputs – each stored and displayed on its respective hard meter
- An interface board, the pulse interface board (PIB), to interface to electronic gaming machines (EGM) using a pulse output

The assembly includes:

- Two printed circuit board assemblies (PCBA)
- Light pipe illumination of the meters when the audit key switch is turned
- Monitoring the presence of the PCBAs through a tamper switch
- Additional protection from a security seal attached to the assembly and the PMM tray, which includes a protective cover and base plate

The following illustration shows a functional block diagram.



Electromechanical Meters Board - Block Diagram

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Meters Interface

The I/O driver board sends pulse drive signals via the backplane board to the PIB and then to the HMB to increment appropriate meters.

Overcurrent Protection

An intelligent power driver is used for switching power ON and OFF through the meter drive outputs. The power switch incorporates built-in overcurrent sensing and protection.

Light Tower Driver & Belly Panel Door Security Interfaces

Connectors that form part of a cable from P2 on the backplane board drive the light tower and provide door security.

Meter Detection

A tamper switch monitors the presence of the HMB assembly. A security seal is also attached to the assembly and the PMM tray.

Electromechanical Meters

Specifications for the electromechanical meters are detailed below.

Item	Measurement
Number of digits	7
Rated voltage	24V DC
Power consumption	46 mA 1.1W
Operating volume range	90 to 110% of rated voltage
Count speed	20 CPS (standard)
Allowable ripple ratio	<10%
Ambient temperature	-25°C to +60°C (operating)
Dielectric strength	1500V AC, 50/60 Hz for 1 minute

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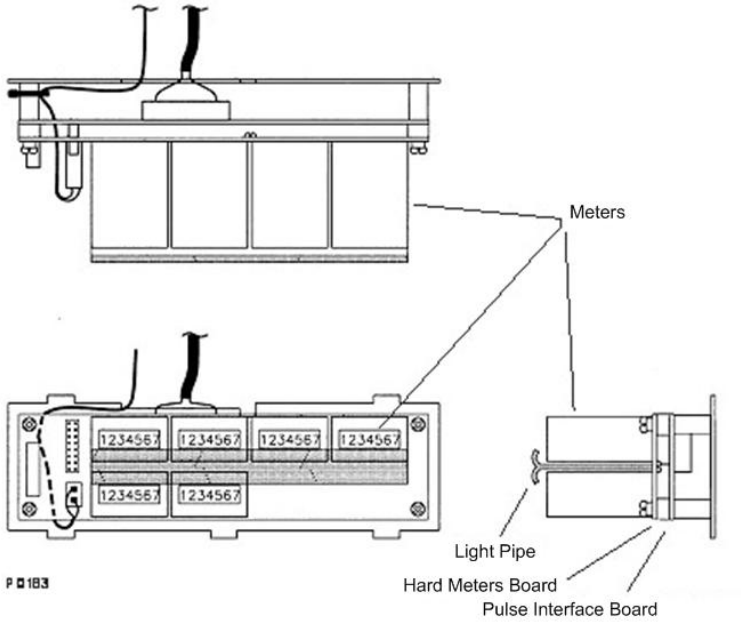
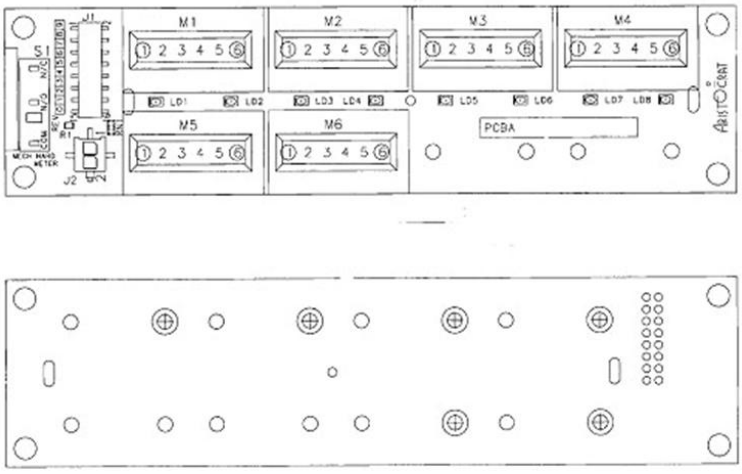
STRUCTURE AND COMPONENTS

The structure of HMB is shown in the Backplane Connections to Pulse Interface Board section. Details of the component layouts for the HMB and the PIB are shown in the following figures.



Electromechanical Meters Board - Component Layout



Electromechanical Meters Board - Component Layout

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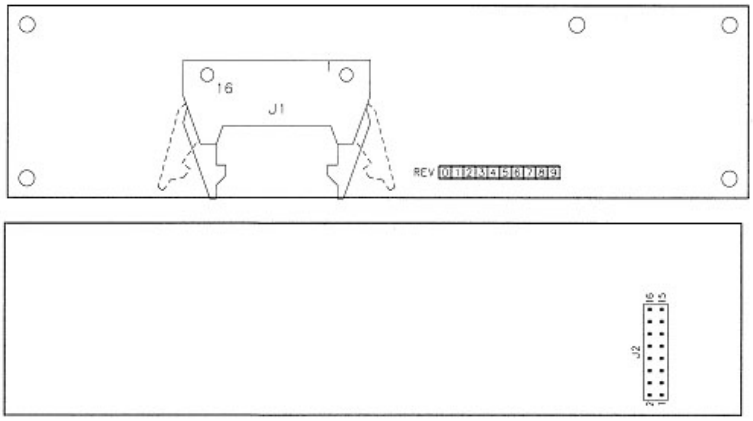
STRUCTURE AND COMPONENTS
(continued)



Pulse Interface Board - Component Layout

If the machine pays out too many coins, or not enough, the machine locks up and cannot be played until the problem is resolved.

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CONNECTOR PIN ASSIGNMENTS

Connection from Backplane Board

The shaded signals (SEC_NC, SEC_NO, and SEC_COM) provide for the belly panel door battery-backed security switch.

This section details connector pin assignments for the backplane board, pulse interface board, and light tower lamps.

The 24-way Minifit Junior® connector connects to a 16-way Honda Connector on the PIB, a 6-way Minifit Junior receptacle on the light tower (if equipped), and a 6-way Minifit Junior Receptacle on the belly panel door security switch (if equipped).

PIN	Signal	Function	Comment
1,2,3,4, 13,14	MET24V	+24V DC (input to meters board)	24V DC supply for meters
5	HM1	Signal to control hard meter no.1 (input to meters board)	Pulse signal for direct connection to the meter (pull-down)
6	HM2	Signal to control hard meter no.2 (input to meters board)	Pulse signal for direct connection to the meter (pull-down)
7	HM3	Signal to control hard meter no.3 (input to meters board)	Pulse signal for direct connection to the meter (pull-down)
8	HM4	Signal to control hard meter no.4 (input to meters board)	Pulse signal for direct connection to the meter (pull-down)
9	HM5	Signal to control hard meter no.5 (input to meters board)	Pulse signal for direct connection to the meter (pull-down)
10	HM6	Signal to control hard meter no.6 (input to meters board)	Pulse signal for direct connection to the meter (pull-down)
11	VCC	+5V DC (input to meters board)	not used on meters board
12,24	GND	Ground	Ground reference
15,16	LTL24V	+24V DC (input to meters board)	24V DC supply for light tower
17	SEC_NC	Security switch - normally closed contact	Belly panel door battery-backed security
18	SEC_NO	Security switch - normally open contact	Belly panel door battery-backed security
19	SEC_COM	Security switch - common contact	Belly panel door battery-backed security
20	LTL1	Signal to control light tower lamp no.1 (input to meters board)	Signal for direct connection to the light tower (pull-down)

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Connection from Backplane Board (continued)

PIN	Signal	Function	Comment
21	LTL2	Signal to control light tower lamp no.2 (input to meters board)	Signal for direct connection to the light tower (pull-down)
22	LTL3	Signal to control light tower lamp no.3 (input to meters board)	Signal for direct connection to the light tower (pull-down)
23	LTL4	Signal to control light tower lamp no.4 (input to meters board)	Signal for direct connection to the light tower (pull-down)

Connection to Pulse Interface Board

A 16-way Honda connector provides the interface to the PIB. The connector is a Minifit Junior type.

Backplane Connections to Pulse Interface Board

PIN	Signal	Function	Source	Comment
1	HM1	Signal for hard meter No.1	Backplane P2 PIN 5	Pulse signal
2	HM2	Signal for hard meter No.2	Backplane P2 PIN 6	Pulse signal
3	HM3	Signal for hard meter No.3	Backplane P2 PIN 7	Pulse signal
4	HM4	Signal for hard meter No.4	Backplane P2 PIN 8	Pulse signal
5	HM5	Signal for hard meter No.5	Backplane P2 PIN 9	Pulse signal
6	HM6	Signal for hard meter No.6	Backplane P2 PIN 10	Pulse signal
7,8,9,11				
10	MET24V	+24V	24V DC supply for meters	
12	VCC	+5V DC		
13,14	GND	Ground	Ground reference	
15,16				

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Connection to Light Tower Lamps

A 6-way cable header connector provides the interface to the light tower lamps. The connector is a Minifit Junior type.

PIN	Signal	Function	Comment
1,6	LTL24V	+24V DC (output to tower lamps)	24V DC supply for tower lamps
2	LTL1	Signal to control light tower lamp no.1 (output from meters board)	Signal for direct connection to the top lamp (pull-down)
3	LTL2	Signal to control light tower lamp no.2 (output from meters board)	Signal for direct connection to the 2nd lamp (pull-down)
4	LTL3	Signal to control light tower lamp no.3 (output from meters board)	Signal for direct connection to the 3rd lamp (pull-down)
5	LTL4	Signal to control light tower lamp no.4 (output from meters board)	Signal for direct connection to the 4th lamp (pull-down)

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GENERAL MAINTENANCE

For general maintenance of the electromechanical meters board:

- Remove any dust or dirt from external surfaces.
- Ensure that all connectors are in good condition and are secure.

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Table of Contents

General Description.....375

Adjusting Output Levels.....377
Audio Input Specifications.....377
Audio Output Specifications.....377
Technical Description.....378
Power Requirements.....381

Connector PIN Assignments.....382

24V Input - J1.....382
24V Spare - J2.....382
Audio Input - J5.....382
Low Frequency Speaker Output - J6.....383
High Frequency Speaker Output - J7.....383
High Frequency Speaker Output - J8.....383

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GENERAL DESCRIPTION

Removal and replacement instructions are located in the Cabinet, Door and Top Box module.

Refer to the Machine Modes module of the Operator Manual for additional information.

The sound system for the electronic gaming machine (EGM) is specially engineered to provide higher levels of audio output, improvements in sound quality, and means to adjust the output levels to meet a wide range of venue requirements.

The system consists of a low-frequency woofer module and a high-frequency sound module located approximately in line with player listening heights.

Output sound levels can be finely adjusted from the Operator Mode menus and screen displays.

Sound System Components

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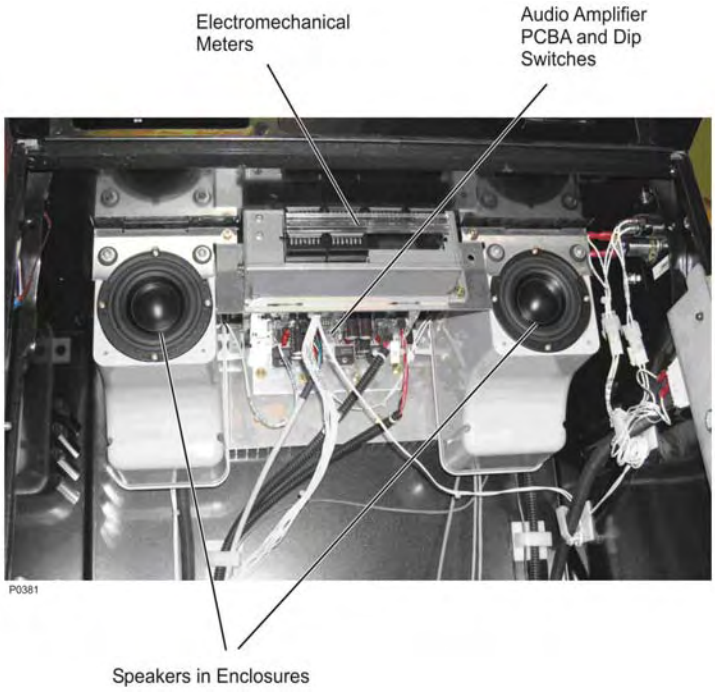
GENERAL DESCRIPTION (continued)



Speaker Amplifier Assembly

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Adjusting Output Levels

Refer to the Machine Modes module of the Operator Manual for additional information.

Machine operators conduct first-line output level adjustment by using the menus in Operator Mode (audit key switch ON). The screen options and instructions are found in the Operator Mode Menu → Operator Setup/Selections [5] → Sound System Setup [5.6].

Audio Input Specifications

Signal Name	Input Impedance	Input Sensitivity	Connector and Pins
Line In	7K ohms	0.775V rms (2.2Vp-p)	J3-T, J3-R
DAC Low Level Input	7K ohms	0.750V rms (2.1Vp-p)	J5-1
MKVI High Level Input	1K ohms	4.9V rms (13.8Vp-p)	J5-5
MKV High Level Input	1K ohms	8.0V rms (22.6Vp-p)	J5-4

Audio Output Specifications

Signal Name	Frequency Response	Output Power	Connector and Pins
Audio Out High Frequency	218Hz-20kHz	48W rms into 2 ohms	
24W rms into 4 ohms			
12W rms into 8 ohms	+Out: J7-1, J8-1		
-Out: J7-2, J8-2			
Audio Out Low Frequency	50Hz-218Hz	48W rms into 2 ohms	
24W rms into 4 ohms			
12W rms into 8 ohms	+Out: J6-5, J6-6, J6-7		
-Out: J6-1, J6-2, J6-3			

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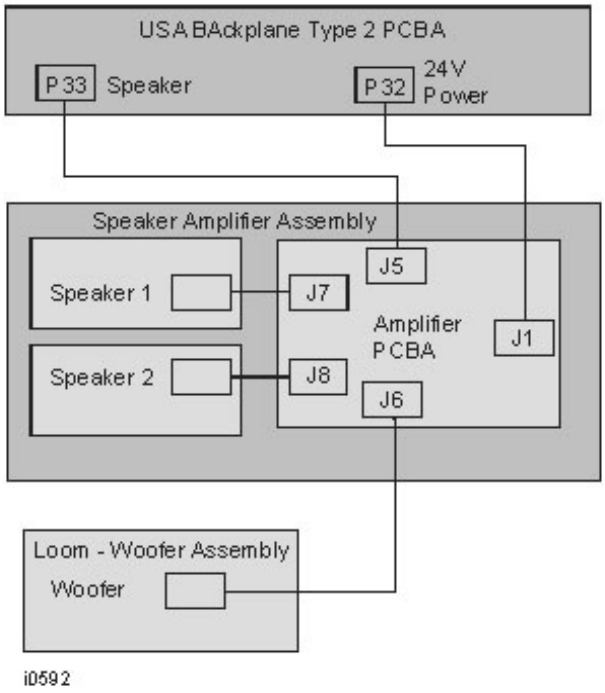
Technical Description

The amplifier operates on 24V DC with a peak current of less than 6A. A mute circuit mutes the speaker outputs for 10 seconds on power ON to minimize turn on transients. A low pass filter on the amplifier input is used for RFI suppression and a differential op-amp for common mode signal rejection. The board is single channel (mono) with a built in 2-way active crossover. The crossover frequency is 218Hz.

The Adjusting Output Levels section defines power output for each of the high and low frequency outputs.

Speaker outputs are short circuit protected by internal current limiting circuitry within the amplifier integrated circuits (IC). These outputs also shut down if the IC's safe junction operating temperature is exceeded.

The amplifier ICs on the printed circuit board (PCB) mount to an aluminum heatsink bracket which is riveted to the PCB. The bracket can be mounted to a suitable finned heatsink to keep the ICs within their normal operating temperature.



Sound System Block Diagram

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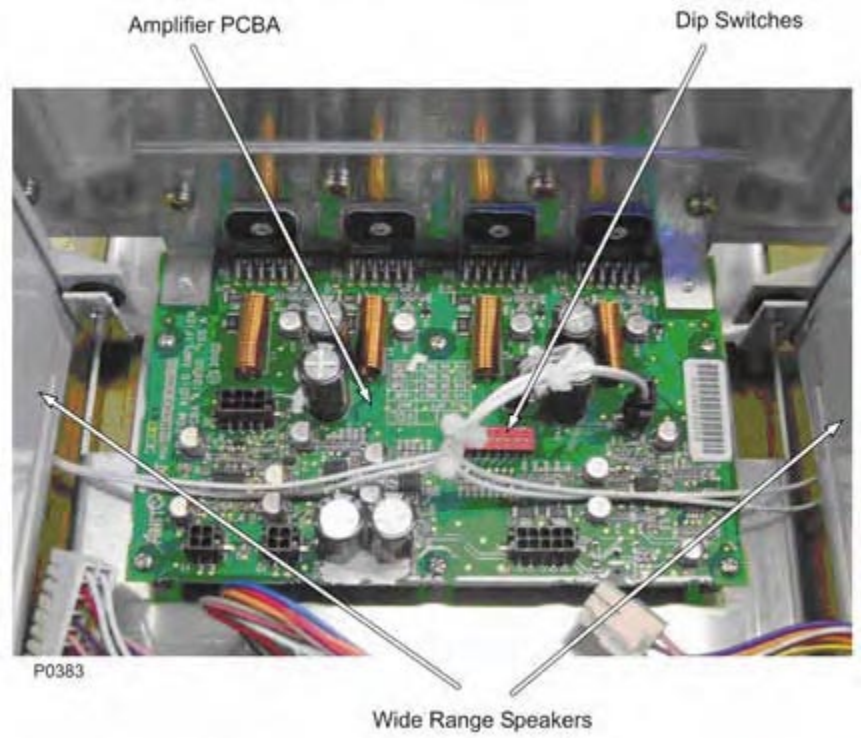
Technical Description (continued)



Audio Amplifier PCBA

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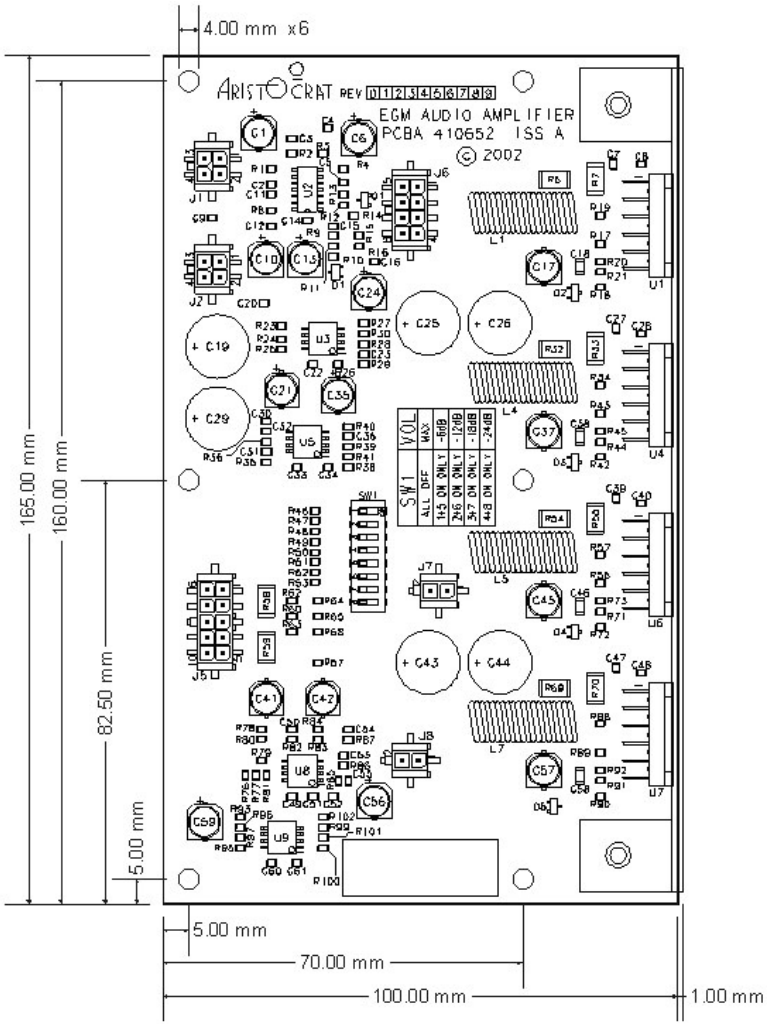
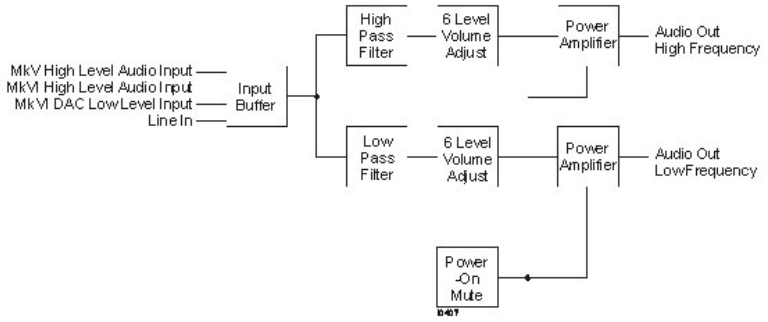
Technical Description (continued)



Audio Amplifier PCBA Component Layout



Amplifier Module Block Diagram

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Power Requirements

Signal Name	Value	Connector and Pins
Input Voltage	24V DC ± 10%	+24V: J1-1, J1-2 GND: J1-3, J1-4
Current	<2.0A cont., 6.0A peak.	
Power Consumption	<150W	

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CONNECTOR PIN ASSIGNMENTS

This section details connector pin assignments for 24V Input, 24V Spare, Audio Input, Low Frequency Speaker Output, High Frequency Speaker Output, and High Frequency Speaker Output.

24V Input - J1

The J1 connector is used to connect 24V power input to the board. The connector is a 4-way Molex Micro-fit Male Header.

PIN	PIN Name	Description
1	P24V	+24V DC
2	P24V	+24V DC
3	GND	Ground
4	GND	Ground

24V Spare - J2

The J2 connector can be used to supply auxiliary 24V power if required. The connector is a 4-way Molex Micro-fit Male Header.

PIN	PIN Name	Description
1	P24V	+24V DC
2	P24V	+24V DC
3	GND	Ground
4	GND	Ground

Audio Input - J5

The J5 connector is used for the Audio Input. The connector is a 10-way Molex Micro-fit Male Header.

PIN	PIN Name	Description
1	+IN_DAC	MKVI DAC low level input signal
2	-IN_COM	Signal common input
3	GND	Ground
4	+IN_MK5	MKV high level signal input
5	+IN_MK6	MKVI high level signal input
6	Not Connected	Not connected
7	Not Connected	Not connected
8	GND	Ground
9	Not Connected	Not connected
10	Not Connected	Not connected

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Low Frequency Speaker Output - J6

The J6 connector is used for the Low Frequency Speaker Output. The connector is an 8-way Molex Micro-fit Male Header.

PIN	PIN Name	Description
1	-OUT_LF	Audio output low frequency negative
2	-OUT_LF	Audio output low frequency negative
3	-OUT_LF	Audio output low frequency negative
4	GND	Ground
5	+OUT_LF	Audio output low frequency positive
6	+OUT_LF	Audio output low frequency positive
7	+OUT_LF	Audio output low frequency positive
8	GND	Ground

High Frequency Speaker Output - J7

The J7 connector is used for the high frequency speaker output. The connector is a 2-way Molex Micro-fit Male Header.

PIN	PIN Name	Description
1	+OUT_HF	Audio Output High Frequency Positive
2	-OUT_HF	Audio Output High Frequency Negative

High Frequency Speaker Output - J8

The J8 connector is used for the high frequency speaker output. The connector is a 2-way Molex Micro-fit Male Header.

PIN	PIN Name	Description
1	+OUT_HF	Audio output high frequency positive
2	-OUT_HF	Audio output high frequency negative

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Table of Contents

Basic Operation.....385

SPC2 LED Operation.....386
Power ON and.....386
Normal Operation.....386
One Flash.....386
Two Flashes.....386
Three Flashes.....386
Four Flashes.....386
Five Flashes.....386
Initialize or Clear NVSRAM.....387

SPC2 Setup and Configuration.....388

Single-Port SPC2 Configuration.....388
SPC2 Connectors (Single Port).....389
Dual-Port SPC2 Configuration.....390
SPC2 Connectors (Dual Port).....391

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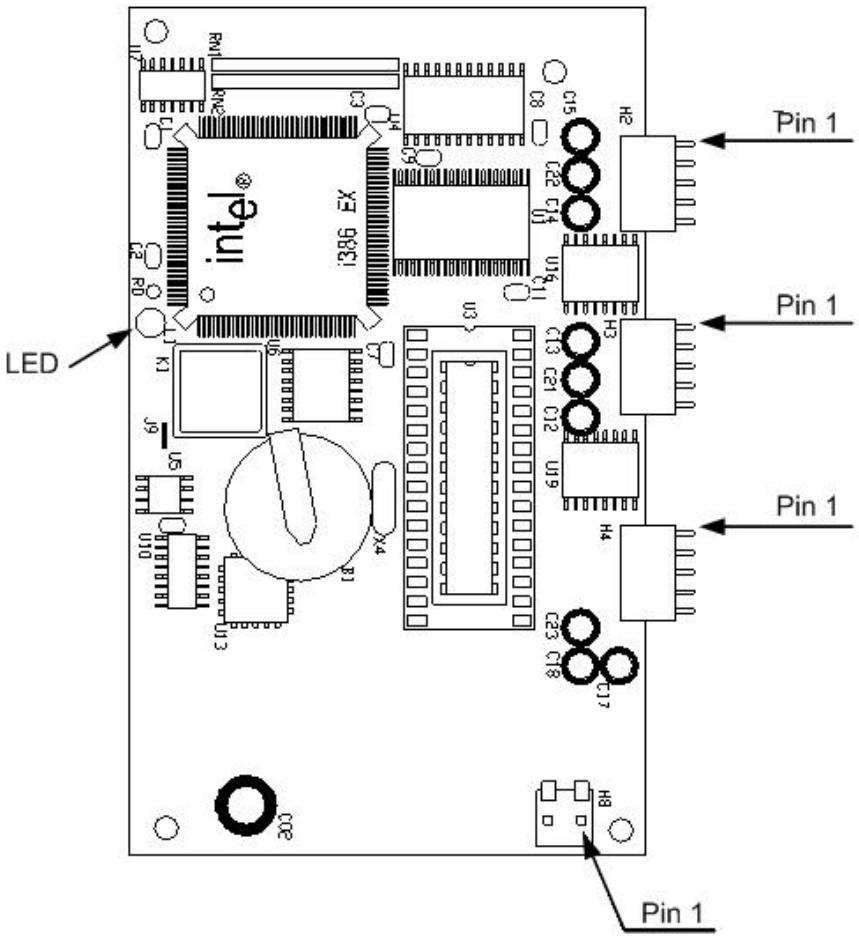
BASIC OPERATION

GAMMA refers to Gaming Machine Manufacturers Association, now referred to as Gaming Standards Association (GSA).

The Serial Protocol Converter (SPC2) board converts the GAMMA used by the EGM to the current version of SAS as required.

The H2 connector on the SPC2 board connects to P19 on the backplane board using an RS-232 interface. The H4 connector on the SPC2 board interfaces with the SAS RS-232 compatible device.



SPC2 Board

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SPC2 LED Operation

When using GAMSAS2 v 02.07.04 firmware or newer, using SetChips and/or clearing game SRAM may result in a Host Disabled lockup (tilt). Re-initialize the SPC2 to clear the tilt.

The LED is located at L1 near the main processor on the SPC2 board. The LED reveals the status of the board. The LED has seven flashing sequences.

# of Flashes	Description
Flicker (10 pps*)	Memory has been cleared
Flash (5 pps*)	Normal operation
1 – pause	No communication on H2 (EGM)
2 – pause	No communication on H3 (EZ-Pay, Lottery, Accounting System, etc.)
3 – pause	No communication on H4 (Accounting System, Lottery, etc.)
4 – pause	NVSRAM error (clear NVSRAM per the Initialize or Clear NVSRAM section below)
5 – pause	Invalid EGM SAS-poll address
*pps = pulses per second	

Power ON and Normal Operation

When the SPC2 board is ON, the LED flashes a distinctive pattern, which indicates the RAM is cleared and the board is polling the EGM and the system interface board (SIB). When communication with the EGM and the SIB are established, the LED flashes continuously at approximately

5 pps, which signals that the board is operating normally.

One Flash

When the LED flashes once repeatedly at a slow rate, communication does not exist in port H2.

Two Flashes

When the LED flashes twice repeatedly, communication does not exist on port H3.

Three Flashes

When the LED flashes three times repeatedly, communication does not exist on port H4.

Four Flashes

When the LED flashes four times repeatedly, the non-volatile static random access memory (NVSRAM) is corrupt and needs clearing. If the EPROM was not changed, clear NVSRAM in the SPC Configuration menu [5.10]. If the EPROM was changed, refer to the Initialize or Clear NVSRAM section for details on clearing the NVSRAM.

Refer to the Machine Modes module of the Operator Manual for additional information.

Five Flashes

When the LED flashes five times repeatedly, the SPC2 address is not set. From the Operator Mode Menu, navigate to Operator Mode Menu → Operator Setup/ Selections [5] → SPC Configuration [5.10] to set the SPC address(es).

The numbers in brackets [ ] represent the selection as it appears on-screen.

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Initialize or Clear NVSRAM

The following procedure outlines manual clearing of the non-volatile static random access memory (NVSRAM) when clearing SPC memory in Operator Mode is unsuccessful, or when replacing an EPROM.

Step	Description
1	Turn the power OFF to the SPC board.
2	Connect the jumper from pin 11 to 13 of the J3 plug on the SPC2 board.
3	Turn the power ON to the SPC board; the LED flashes four times, then flash fast repeatedly.
4	Turn the power OFF to the SPC board.
5	Remove the jumper from pin 11 and 13 of plug J2 on the SPC2 board.
6	Turn the power ON to the SPC board; the LED flashes two times. Normal operation is indicated by five flashes, upon which configuration of the SPC2 can be conducted. See the Single-Port SPC2 Configuration section, or the Dual-Port SPC2 Configuration section in this module for more information.

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SPC2 SETUP AND CONFIGURATION

Single-Port SPC2 Configuration

The numbers in brackets [ ] represent the selection as it appears on-screen.

This section provides details on the setup and configuration for the single-port and dual-port SPC2.

Step	Description
1	From the Operator Mode Menu, navigate to Operator Mode Menu → Operator Setup/Selections [5] → Game Machine Options [5.1].
2	Set the Comms Protocol option to Gamma.
3	In the SPC Configuration menu [5.10] set the SPC ID Number: **Step** / **Description** A – Set the SPC ID Number in the SPC Configuration menu to 1. B – Set the Single/Dual Port option to Single Port. C – Save options and then clear the SPC 2 memory by following the on-screen cues.
4	If step 3C is unsuccessful, initialize the NVSRAM as described in the Initialize or Clear NVSRAM section.

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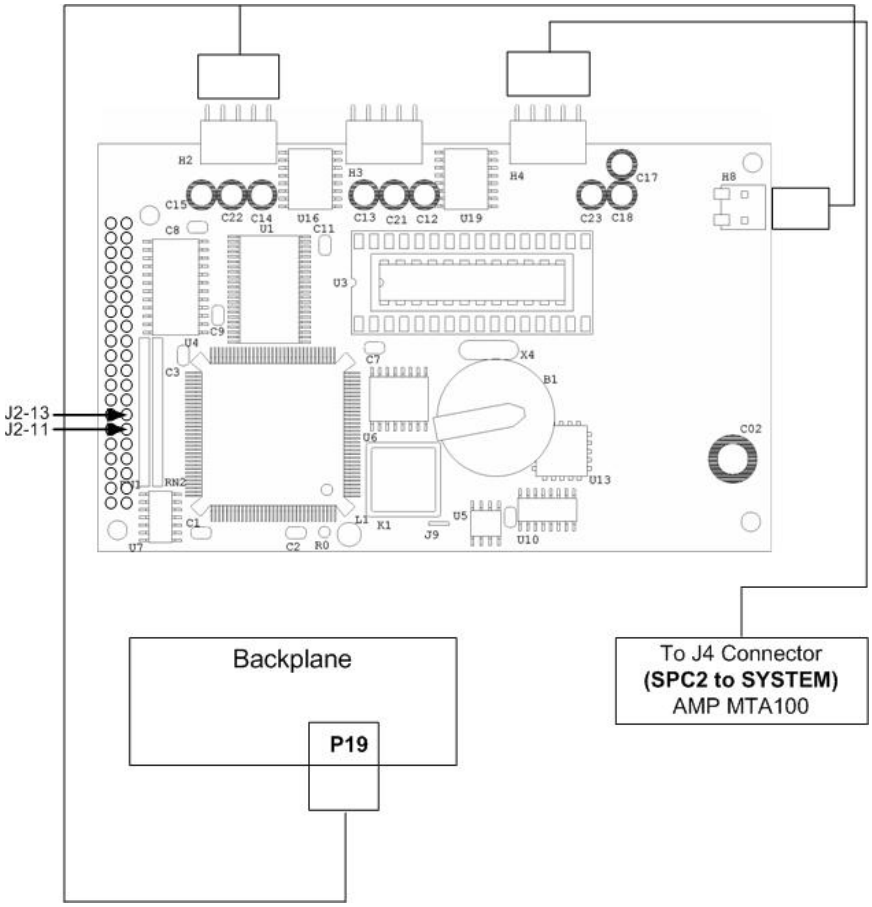
SPC2 Connectors (Single Port)

Connector(s)	Description	PIN(s)	Description
H2, H3, H4	AMP MTA100x5 (640457-5, or 640440-5 with 640642-5)	2	TXD
		3	RXD
		5	GND
H8	AMP MTA156x2 (644611-2)	1	+5VDC
		2	GND



SPC2 Single Port Connectors

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Dual-Port SPC2 Configuration

Requires EGM firmware A4.2.1 or newer.
The numbers in brackets [ ] represent the selection as it appears on-screen.

Step	Description
1	From the Operator Mode Menu, navigate to Operator Mode Menu → Operator Setup/Selections [5] → Game Machine Options [5.1].
2	Set the Comms Protocol option to Gamma.
3	In the SPC Configuration menu [5.10] set the SPC ID Number:

Step	Description
A	Set the four left digits of the SPC ID Number to the appropriate address for Port 1 (H3). *Do not use leading zeros as a placeholder; move cursor to position digits. Example: EZ Pay = address _427 and SAS = address 0001. Therefore, the SPC ID number = _4270001.*
B	Set the four right digits of the SPC ID Number to the appropriate address for the system connected to Port 0 (H4).
C	Set the Single/Dual Port option to Dual Port.
D	Select the appropriate port for each of the data types listed (Handpay Mode, Validation Mode and EFT/AFT).
E	Save options and then clear the SPC 2 memory by following the on-screen cues.

4	If step 3E above is unsuccessful, initialize the NVSRAM as described in the Initialize or Clear NVSRAM section.

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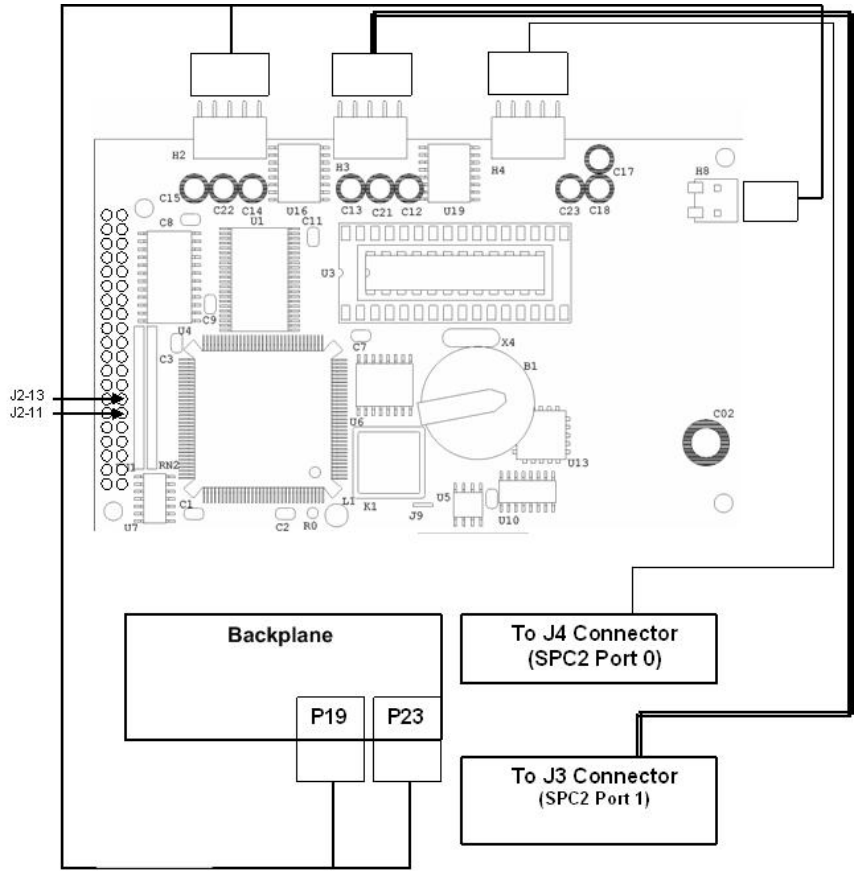
SPC2 Connectors (Dual Port)

Connector(s)	Description	PIN(s)	Description
J2, J3, J4	AMP MTA100x5 (640457-5, or 640440-5 with 640642-5)	2	TXD
		3	RXD
		5	GND
J8	AMP MTA156x2 (644611-2)	1	+5VDC
		2	GND



SPC2 Dual Port Connectors

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Table of Contents

Tilt/Error Conditions 394

Soft Tilts 394
Hard Tilts 394

Machine Lockup 395

Entry to the Current Lockup Screen 395
Indication of Conditions 395
No Power 396
Fluorescent Tubes are not Illuminated 396
Equipment is connected to the auxiliary power outlet but has no power 396
Machine has no power 396
No power-up cycle 396
Play Button LEDs do not Illuminate 397
Main LCD Panel 398
Main LCD Panel Blank 398
Main LCD Panel Video Image Color or Picture Incorrect 398
Main LCD Panel Showing "No Signal Input" 398
CRT Monitor 399
Monitor Screen Blank 399
Monitor Video Image Color Incorrect or Erratic 399
Sound 400
No Sound 400
Sound Too Loud or Too Soft 400
Coin Handling System 401
All Coins are Going to the Cashbox and the Hopper is Empty 401
Coins Accepted by the Coin Acceptor but not Registered as Credits; the Machine Locks Up 401
Coin Acceptor Fault / Coin Optic Fault Message 401
Coins Continually Rejected 402
Coins Jamming at the Top of the Hopper Chute 402
Coins Jamming in the Cashbox Feed Chute 402
Coins Stacking at the Bottom of the Bowl 402
Hopper Does Not Rotate 402
Hopper Not Working 403
Illegal Coin Out Message on Power On 403
Rejected Coins are not Falling into the Coin Tray 403
Too Many Coins Dispensed and the Machine Locks Up 403
Yoyo Message during Machine Inactivity 403
3 Way Metering Error Message 404

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Startup Messages 405

Panic Messages 406

CPU Error! 406
SRAM Error! 406
Program Loading Verification Error! 406
Platform Unknown 406
System EPROM Checksum Error! 406
Market AVL Media Header Error! 406
Market AVL Media Checksum Error! 406
Game EPROM Not Present 406
Game EPROM Header Error 406
Game EPROM Checksum Error 407
AVL Media Not Present 407
AVL Media Header Error 407
AVL Media Checksum Error 407
Game Version Incompatible 407
String Not Found 407
Watchdog Reset 407
Audit Mode - Turn Audit Key ON 407

Bill Acceptors, Coin Acceptors and Ticket Printers 408

Bill Acceptors 408
Coin Acceptors 408
Ticket Printers 408

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TILT/ERROR CONDITIONS

There are two types of error conditions detected and displayed by the EGM: “soft” tilts and “hard” tilts.

Soft Tilts

Soft tilts are tilt/error conditions that allow game play to continue. There are two types of soft tilts: those which must be resolved by an attendant, and those that reset themselves when the cause of the tilt is no longer present and a predetermined period of time has elapsed.

Hard Tilts

Hard tilts are routine hardware machine maintenance conditions that prevent game play and must be resolved by an attendant. Hard tilts cause error or status messages to display on-screen.

External key switches, located on the outside of the machine cabinet, are used to perform various functions. The key switches are accessible without opening the main door.

Hard tilt messages clear after the tilt condition is resolved and the attendant turns the key in the key switch to the center (OFF) position.

Most hard tilts can be cleared by opening and closing the main door.

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MACHINE LOCKUP

Refer to the Machine Modes module of the Operator Manual for additional information.

The EGM has an extensive self-monitoring system. When abnormal conditions are detected, the EGM automatically locks up; for example, it activates tilt mode. The presence of active lockups (otherwise referred to as tilts) is indicated by a LOCKUP ERROR TO BE ACKNOWLEDGED message at the bottom of the screen.

In tilt mode, the message area displays guidance information, and the EGM is disabled to prevent any further player interaction. Tilt mode conditions are located in the Operator Mode → Current Lockup [7].

Entry to the Current Lockup Screen

Entry to the Current Lockup screen is achieved by turning the audit (operator) key switch ON (clockwise) and selecting Current Lockup [7] from the Operator Mode Menu.

Indication of Conditions

The Current Lockup screen displays and the conditions requiring attention are highlighted by three asterisks (***) as shown below. Each lockup condition has an associated help screen that provides information on the cause of the lockup and the procedure for resetting it. The Lockup Help Displays section provides a summary of the lockup help comments.

CURRENT ACTIVE LOCKUPS

Cash Out Handpay	Coin Reversal	*** Progressive Discont
Jackpot Win	*** Coin Acceptor Fault	Prog. Comm. Error
Win Handpay	*** Coin Optic Fault	Smart Reel Discont
Mystery Handpay	Coin Diverter Fault	Smart Reel Movement
Link Jackpot	Hopper Empty	Smart Reel Tilt
Bonus Handpay	Hopper Jammed	Meters Disconnected
Self Audit Error	Hopper Disconnected	Meters Faulty
3 Way Memory Error	Illegal Coin Out	Battery #1 Low
Game EPROMs Changed	Bill Acceptor Error	Battery #2 Low
Game Machine Options	Bill Acc. Stacker	Touch Screen Error
Jurisdiction Options	Bill Reversal	Out of Service
EEPROM CRC Mismatch	Bill Not Credited	Host Disable
Main Door Mismatch	Signature Error	Top Screen Discont
Main Door Open	Printer Signature Error	Prog. Disable CA
*** Drop Door Open	*** Printer Disconnected	Prog. Disable
*** Logic Door Open	Printer Jam/Failure	Prog. Lvl Mismatch
Belly (BA) Door Open	Paper Depleted	
Cashbox (Stacker) Door Open		

The characters *** indicates active lockups

Service	—	Press to select next lockup
Cashout/TakeWin	—	Press to select previous lockup
Play 5 Lines	—	Press to move curser left
Play 10 Lines	—	Press to move curser right
Play 25 Lines	—	Press to see selected lockup help
Bet 3 Credits	—	Press to return to previous menu
Audit Key	—	Turn off to exit

"Lockup error to be acknowledged"

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No Power

Equipment is connected to the auxiliary power outlet but has no power

Probable Cause(s)	Auxiliary power outlet fuse is blown.
Action(s)	Replace auxiliary power outlet fuse.

Machine has no power

Condition: Power outlet switch assembly lamp is ON.	
Probable Cause(s)	Power supply fuse blown.
Action(s)	Replace entire power supply assembly.

No power-up cycle

Probable Cause(s)	Defective main board.
Action(s)	Pull the main board and apply power to the machine. If EGM lamps and monitor turn ON, switch power OFF and replace the main board.

Fluorescent Tubes are not Illuminated

Probable Cause(s)	Defective fluorescent tube or electronic ballast.
Action(s)	Replace fluorescent tube or electronic ballast.

Probable Cause(s)	Defective power supply assembly.
Action(s)	Check that the power supply assembly is operating correctly. If not, replace it.

Probable Cause(s)	Cable and sockets.
Action(s)	Insure fluorescent socket is not loose or cracked, and that the tube makes good contact.

Removal and replacement instructions are located in the Cabinet, Door and Top Box module.

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Play Button LEDs do not Illuminate

Condition: Switch works in test mode.	
Probable Cause(s)	Defective LED or assembly.
Action(s)	Replace LED sub-assembly.

Condition: Cannot enter test mode.	
Probable Cause(s)	Defective or incorrect I/O board.
Action(s)	Check the I/O board and replace if needed. Check the I/O board seating/connector.

Condition: Cannot enter test mode.	
Probable Cause(s)	Lamp button assembly.
Action(s)	Check the LED lamps for shorting 12 volt line.

Removal and replacement instructions are located in the Cabinet, Door and Top Box module.

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Main LCD Panel

Main LCD Panel Blank

Condition: Fluorescent lamps illuminate. **Condition: The main board shows one LED steady and the other blinking.** **Condition: The On Screen Display (OSD) green (power) light illuminates.**	
Probable Cause(s)	Defective LCD panel.
Action(s)	After ensuring the cables to the monitor are in good condition, wired and connected properly, replace the LCD panel.

Main LCD Panel Video Image Color or Picture Incorrect

Probable Cause(s)	Monitor settings are incorrect.
Action(s)	Restore factory settings via OSD.

Probable Cause(s)	Defective LCD panel.
Action(s)	If the condition persists, replace the LCD panel.

Main LCD Panel Showing “No Signal Input”

Probable Cause(s)	LCD panel not receiving signal from the main board.
Action(s)	Check main board seating. Ensure the chips are inserted correctly in their respective sockets. If the condition persists, replace the main board.

Probable Cause(s)	Short or interruption of 5-volt main board power.
Action(s)	Check the SPC2 board. Turn power OFF for 5 seconds; turn power ON. If the condition persists, contact the Aristocrat Service Organization.

Removal and replacement instructions are located in the Cabinet, Door and Top Box module.

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CRT Monitor

Monitor Screen Blank

Probable Cause(s)	The main EGM power cord is loose.
Action(s)	Verify that the power cord is snuggly connected.

Probable Cause(s)	The power supply fuse is blown.
Action(s)	Replace the main EGM power supply fuse.

Probable Cause(s)	The main board in the logic cage is loose or defective.
Action(s)	Verify correct seating of the main board. Replace the main board.

Probable Cause(s)	The monitor fuse is blown.
Action(s)	Replace the monitor fuse.

Probable Cause(s)	Defective monitor.
Action(s)	Replace the monitor.

Monitor Video Image Color Incorrect or Erratic

Probable Cause(s)	Settings may need adjustment.
Action(s)	Restore factory preset parameters using OSD. Degauss using OSD. Degauss using external degaussing wand.

Probable Cause(s)	Defective monitor.
Action(s)	Replace the monitor.

Probable Cause(s)	The power supply is defective.
Action(s)	Replace the power supply.

Removal and replacement instructions are located in the Cabinet, Door and Top Box module.

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Sound

No Sound

Probable Cause(s)	Cables and connectors
Action(s)	Insure cables to amplifier and speakers are in good condition, wired and connected properly.

Probable Cause(s)	Speakers
Action(s)	Remove the connectors from the speaker terminals and check that there is 2-4Ω across the speaker terminals. If not, replace the speaker.

Probable Cause(s)	Defective amplifier assembly.
Action(s)	If condition persists, replace the amplifier assembly.

Probable Cause(s)	Defective main board.
Action(s)	If condition persists, replace the main board.

Sound Too Loud or Too Soft

Probable Cause(s)	Volume control requires adjustment.
Action(s)	Adjust the volume setting using the sound system setup in the Operator Setup/Selection menu.

Refer to the Machine Modes module of the Operator Manual for additional information.

Probable Cause(s)	Defective speaker amplifier assembly.
Action(s)	If condition persists, replace the amplifier assembly.

Removal and replacement instructions are located in the Cabinet, Door and Top Box module.

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Coin Handling System

All Coins are Going to the Cashbox and the Hopper is Empty

Probable Cause(s)	Hopper probe shorted to ground.
Action(s)	Clear the short.

Probable Cause(s)	Defective coin diverter solenoid on the coin chute assembly.
Action(s)	Run a coin chute test to verify the solenoid has power. Verify that the solenoid has power. Verify that the coin diverter is not jammed. Verify that the hopper probe is not permanently grounded.

Probable Cause(s)	Coin diverter jamming.
Action(s)	Adjust the position of the coin diverter.

Coins Accepted by the Coin Acceptor but not Registered as Credits; the Machine Locks Up

Probable Cause(s)	Defective harness between the coin acceptor and the backplane board.
Action(s)	Check that the harness is correctly seated.

Probable Cause(s)	Defective coin acceptor.
Action(s)	Replace the coin acceptor.

Probable Cause(s)	The photo-optic module in the comparitor is defective.
Action(s)	Check that the module and its connectors are secure. Replace if necessary.

Coin Acceptor Fault / Coin Optic Fault Message

Probable Cause(s)	Defective harness between the coin acceptor and the backplane board.
Action(s)	Check that the harnesses are seated correctly and have continuity.

Probable Cause(s)	Coins jammed in coin acceptor.
Action(s)	Remove jammed coin.

Removal and replacement instructions are located in the Cabinet, Door and Top Box module.

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Coin Handling System (continued)

Coins Continually Rejected

Probable Cause(s)	The sample coin not in the correct location in the unit.
Action(s)	Verify that the sample coin is correctly located.

Probable Cause(s)	The unit is not working.
Action(s)	Verify that the unit has power. If yes, replace the comparitor.

Probable Cause(s)	Defective coin acceptor.
Action(s)	Replace the coin acceptor.

Coins Jamming at the Top of the Hopper Chute

Probable Cause(s)	Coin jam at top of chute.
Action(s)	Rotate the disk backwards by inserting fingers through gaps in the casting and exerting finger pressure.

Probable Cause(s)	Coin runner is loose or not in the correct position.
Action(s)	Place the coin runner point as close as possible to the disk and tighten the securing nuts. Also check if the shims are damaged.

Coins Jamming in the Cashbox Feed Chute

Probable Cause(s)	The cashbox chute is blocked or misaligned.
Action(s)	Unblock and/or realign the chute and tighten the fixing screws.

Coins Stacking at the Bottom of the Bowl

Probable Cause(s)	Bottom coin slide springs broken or displaced.
Action(s)	Refit or replace the spring.

Hopper Does Not Rotate

Probable Cause(s)	Defective harness between the hopper and the backplane board.
Action(s)	Check that the harness is seated correctly.

Probable Cause(s)	Defective hopper motor.
Action(s)	Replace hopper motor.

Removal and replacement instructions are located in the Cabinet, Door and Top Box module.

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Coin Handling System (continued)

Hopper Not Working

Probable Cause(s)	No power is supplied.
Action(s)	Check that power is reaching the hopper.

Probable Cause(s)	Defective connector.
Action(s)	Check that each connector is not damaged and is correctly seated.

Probable Cause(s)	Hopper is not correctly located.
Action(s)	Remove and replace the hopper.

Illegal Coin Out Message on Power On

Probable Cause(s)	Dirty hopper photo-optic detector/emitter.
Action(s)	Clean the hopper photo-optic detector/emitter.

Probable Cause(s)	Defective hopper.
Action(s)	Run a hopper test (see Machine Modes) to verify that the hopper motor stops when the correct number of coins is ejected.

Rejected Coins are not Falling into the Coin Tray

Probable Cause(s)	Coins jammed in the reject chute.
Action(s)	Carefully clear the reject chute.

Too Many Coins Dispensed and the Machine Locks Up

Probable Cause(s)	The coin pawl is bent or loose.
Action(s)	Tighten the fixing screw or replace the pawl or spring.

Yoyo Message during Machine Inactivity

Probable Cause(s)	Coin jammed in the coin acceptor.
Action(s)	Remove jammed coin.

Probable Cause(s)	Defective coin acceptor.
Action(s)	Replace the coin acceptor.

Removal and replacement instructions are located in the Cabinet, Door and Top Box module.

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3 Way Metering Error Message

Refer to the Machine Modes module of the Operator Manual for additional information.

Probable Cause(s)	Corrupt data. Inconsistent data across all three electronic audit meter sets.
Action(s)	Perform a memory reset (see Machine Modes). If condition persists, replace the main board.

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STARTUP MESSAGES

Startup messages are shown as part of the normal startup procedures during which the software is loaded and the game screen is displayed. These messages are provided for “information only” purposes and simply show the progress of the startup procedures. Startup messages require no action:

- System EPROM checksum ok
- CPU ok
- Standard platform found
- WIN32 platform found
- Market AVL media header checksum ok
- Game EPROM present
- Game EPROM checksum ok
- AVL media header checksum ok
- Game Version check ok
- \fFound 1 video chip.\n
- Initialized in 3D mode.\n
- Using 32 bit display mode.\n
- Using 32 bit textures (8-8-8-8).\n
- Restarting in 10 seconds...
- DRAM ok
- SRAM ok
- USA platform found
- Market AVL media present
- Market AVL media checksum ok
- Game EPROM header checksum ok
- AVL media present
- AVL media checksum ok
- Program loading verification ok
- \fFound 2 video chips.\n
- Using 16 bit display mode.\n
- Using 16 bit textures (5-6-5 and 4-4-4-4).\n
- Loading resources...\n

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PANIC MESSAGES

A panic message indicates that a software failure occurred. The EGM automatically resets and restarts. The event is registered in the panic log (for details, see the Machine Modes module)

One from a number of different messages, for example Uninitialized Exception Vector, can display for a few seconds followed by the message WATCHDOG RESET.

In all cases, the Aristocrat Service Organization should be informed.

CPU Error!

Probable Cause(s)	Problem on the main board.
Action(s)	Technician to replace main board.

SRAM Error!

Probable Cause(s)	Problem on the main board.
Action(s)	Technician to replace main board.

Program Loading Verification Error!

Probable Cause(s)	Problem on the main board.
Action(s)	Technician to replace main board.

Platform Unknown

Probable Cause(s)	Problem on the interface/backplane board.
Action(s)	Replace the interface/backplane board.

System EPROM Checksum Error!

Probable Cause(s)	Defective system EPROM.
Action(s)	Technician to replace system EPROMs.

Market AVL Media Header Error!

Probable Cause(s)	Defective system EPROM.
Action(s)	Technician to replace system EPROMs.

Market AVL Media Checksum Error!

Probable Cause(s)	Defective system EPROM.
Action(s)	Technician to replace system EPROMs.

Game EPROM Not Present

Probable Cause(s)	Defective game EPROM.
Action(s)	Technician to replace game EPROMs.

Game EPROM Header Error

Probable Cause(s)	Defective game EPROM.
Action(s)	Technician to replace game EPROMs.

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Game EPROM Checksum Error

Probable Cause(s)	Defective game EPROM.
Action(s)	Technician to replace game EPROMs.

AVL Media Not Present

Probable Cause(s)	Defective game EPROM.
Action(s)	Technician to replace game EPROMs.

AVL Media Header Error

Probable Cause(s)	Defective game EPROM.
Action(s)	Technician to replace game EPROMs.

AVL Media Checksum Error

Probable Cause(s)	Defective game EPROM.
Action(s)	Technician to replace game EPROMs.

Game Version Incompatible

Probable Cause(s)	Defective game EPROM.
Action(s)	Technician to replace game EPROMs.

String Not Found

Probable Cause(s)	Required string not in game EPROM.
Action(s)	Call technical support.

Watchdog Reset

Probable Cause(s)	The EGM reset itself trying to recover from a serious error.
Action(s)	See panic messages above.

Audit Mode - Turn Audit Key ON

Probable Cause(s)	Audit key was turned ON when machine was powered down.
Action(s)	After power ON, turn audit key ON and OFF.

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BILL ACCEPTORS, COIN ACCEPTORS AND TICKET PRINTERS

Troubleshooting on specific bill acceptor, coin acceptor, and ticket printer models are detailed in the Bill Acceptors, Coin Handling System, and Ticket Printers modules in this manual.

Information relating to specific bill acceptor, coin acceptor, and ticket printer models is available through the manufacturer's website as listed below.

Bill Acceptors

MEI Cashflow SC: www.meiglobal.com

JCM® UBA™, WBA™ and Sentry™ Bezel: www.jcm-american.com

Coin Acceptors

Coin Mechanisms Inc., MC-62 coin comparitor: www.coinmech.com

Money Controls Condor CP133S validator: www.moneycontrols.com

IDX X-10 and X-20 series Xeptor: www.idxinc.com

Ticket Printers

FutureLogic GEN2™: www.futurelogic-inc.com

Ithaca® Epic 950™ and Model 850: www.transact-tech.com

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Symbols

+24V Auxiliary Output
Connectors 74
+24V Fluorescent Output
Connectors 74
+24V Main Output
Connectors 74
24V Input - J1
Sound System 382
24V Spare - J2
Sound System 382
3M Touch Systems
Touch Screen..... 135
3 Way Metering Error Message
Troubleshooting..... 404
4-PIN Minifit Connector PIN Connections
LCD Panel 123

A

Accepted Coins
Condor 90
Access and Location
Hopper 101
Power Supply.....62
Additional Information 5
Address Decoding
I/O Address Map 308
I/O Board 308
Adjusting Output Levels
Sound System 377
Alarm
Condor 91
Amendments 8
Animation and Light Tower Lamps.....311
Anti-pullback Error Conditions
JCM UBA
Appendix A..... 200
Anti-Pullback Mechanism Test
JCM UBA 172
Appendix A
Anti-pullback Error Conditions
JCM UBA 200
Bill Acceptance Test DIP Switch Settings
JCM UBA 201
Bill Stacker Test Error Conditions
JCM UBA 198
Cashflow Bill Acceptor Diagnostic Codes
JCM UBA 197
Centering Mechanism Error Conditions
JCM UBA 200
LED Reject Codes
JCM UBA 205
Malfunction LED Error Codes
JCM UBA 203
Running Test Error Conditions
JCM UBA 199
Solenoid Mechanism Error Conditions
JCM UBA 200
Transport Motor Speed Test Error Conditions
JCM UBA 198
Assembly (Acceptor and Transport) Removal
JCM UBA 163
JCM WBA..... 186
Audio
XP Main Board..... 223
Audio Amplifier PCBA
Sound System 379
Audio Input - J5
Sound System 382
Audio Input Specifications
Sound System 377
Audio Output Specifications
Sound System 377
Auxiliary Output Current Protection.....68
Auxiliary Output EMC Filtering.....68
Auxiliary Output Voltage.....68
Auxiliary Output Current Protection 68
Auxiliary Output EMC Filtering.....68
Auxiliary Power Outlet Output
Connectors 73
Available Models
Coin Handling System.....77

B

Backplane
Connector Keying 258
Connector P1 - Debug.....276
Connector P10 - BNA Lights 282
Connector P11 - Buttons and Button Lamps..... 283
Connector P12 - Expansion I/O..... 284
Connector P13 - Key Switches and BNA... 285
Connector P14 - Door Distribution..... 286
Connector P15 - Spare Power 287
Connector P16 - Fan 287
Connector P17 - Power Supply 288
Connector P18 - IGT SAS+ (PT95A) or Bally SDS..... 288

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Connector P19 - Broadcast DACOM Port.. 289
Connector P2 - Light Tower/Hard Meters/ NA Security....277
Connector P20 - Monitor 2.... 289
Connector P23 - Com2/ Com4 Mikohn.... 290
Connector P27 - Handle, Spare Switch and Com8....291
Connector P3 - Logic Door....278
Connector P32 - 24V Power 291
Connector P33 - Speaker 292
Connector P35 - 24V.... 292
Connector P36 - 24V.... 292
Connector P37 - 24V.... 293
Connector P4 - Monitor 1 278
Connector P7 - Hopper/Ticket Printer 279
Connector P8 - Com6 and Com7 Spare Serial Outputs 280
Connector P9 - Switches and Com7 Spare Serial Outputs 281
Connectors 259
Electrical Connections 256
Electrical Specifications.... 294
J1 to J1 Extended I/O Driver II Board Connector 269
J2 to J2 Extended I/O Driver Board II Connector 271
J3 to J3 on the Extended I/O Driver II Board 273
JP20 to P20 Main Board Connector .. 259
JP21 to P21 Main Board Connector .. 266
JP22 to P22 Main Board Connector .. 263
Physical Description.... 252
Security.... 255
System Connectors 255
System Overview 254
Backplane Board
Removal and Replacement 27
Backplane Connections to Pulse Interface Board
Meters....371
Backplane Connector (Comms) - P20
XP Main Board....241
Backplane Type 2 Board
Removal and Replacement 27
Bashbutton LED
Removal and Replacement 53
Basic Operation
Condor 88
Diverter Solenoid and Photo-Optic Sensor 78
Hopper 100
MC-62 81
Power Supply....64
SPC2385
Battery Backup Circuit
XP Main Board.... 226
Belly Door 54
Fluorescent Ballast
Removal and Replacement 57
Fluorescent Lighting 57
Fluorescent Tube
Removal and Replacement 57
Belly Door Security Switch....16
Bill/Coupon/Voucher Entry 148
Bill Acceptance Test
JCM UBA 174
Bill Acceptance Test DIP Switch Settings
JCM UBA
Appendix A....201
Bill Acceptor....30
Bill Acceptor Cage
Removal and Replacement 30
Bill Acceptor Lamps 311
Bill Acceptor Removal 151
Bill Acceptors
Installation and Machine Conditions. 144
Troubleshooting.... 408
Bill Jam Near the Bill Acceptor's Entrance
JCM UBA 165
Bill Jam Near the Cashbox Entrance
JCM UBA 165
Bill Stacker Test Error Conditions
JCM UBA
Appendix A.... 198
Block Diagram
Power Supply....64
Brightness Adjustment Range
LCD Panel 122
Button Lamps/LEDs....311
Button Panel....47
Removal and Replacement 48
Button Switches
I/O Board 310

C

Cabibration
In-machine Auto-calibration
JCM WBA 189
Cabinet
Backplane Board....27
Backplane Type 2 Board....27

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Bill Acceptor....30
CCB 29
Communications Configuration Board..29
Drop Box....33
Extended I/O Driver II Board....28
Hopper....32
I/O Board....28
Logic Cage....24
Main Board....26
Main Display Area....19
Power Supply....31
XP Main Board....26
Cabinet, Door and Top Box
Technical Description....15
Cabinet Components
Backplane....13
Bill acceptor....13
Cabinet assembly and security....13
Communications configuration board ..13
CRT monitor and LCD panel....13
drop box....13
hopper....13
I/O driver board....13
Logic cage....13
XP main board....13
Cable Connector
CRT Monitor....113
Calibration
Adjustment Procedure
JCM UBA....169
Auto-calibration Procedure
JCM WBA....189
In-machine Auto-calibration
JCM UBA....168
JCM UBA....168
JCM WBA....189
Set Black Reference Paper
JCM UBA....170
Set UV Reference Paper
JCM UBA....170
Set White Reference Paper
JCM UBA....169
UBA Adjust Tool Screen
JCM UBA....169
Workbench Auto-calibration
JCM UBA....168
JCM WBA....189
Care and Maintenance
Epic 950....348
Ithaca 850....361
Cleaning the Print Head....361
Mars 152
Cashbox Removal....150
JCM UBA....162
Cashbox Removal and Replacement....185
JCM WBA....185
Cashbox Replacement....150
Cashflow Bill Acceptor Diagnostic Codes
JCM UBA
Appendix A....197
Casino Management Systems....7
CCB
Configuration....316
Connector PIN Assignment....317
Functional Description....316
General Maintenance....319
Interface....316
Interface Signals....316
Location and Access....316
Part Number....316
Physical Description....316
Removal and Replacement....29
Centering Mechanism Error Conditions
JCM UBA
Appendix A....200
Centering Mechanism Test
JCM UBA....173
Cleaning
Condor....92
JCM UBA....166, 167
JCM WBA....188
Cleaning the Print Head
Ithaca 850....361
Clearing a Paper Jam
GEN2....332
Clearing Bill Acceptor Jams
JCM UBA....165
JCM WBA....187
ClearTek™ II
Touch Screen....135
Coin Acceptor
Removal and Replacement....49
Coin Acceptors
Troubleshooting....408
Coin Accept Solenoid
MC-62....85
Coin Chute Assembly
General Maintenance....79
Coin Comparator
General Maintenance....79
Removal and Replacement....49
Coin Dispensing
Hopper....105
Coin Handling System....49

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Available Models 77
Diverter Solenoid and Photo-Optic Sensor 78
Location and Access 77
MC-62 80
Overview 77
Specifications 77
Troubleshooting 401
Coin Jamming Prevention
Hopper 105
Coin Tray 58
Coin Validator
General Maintenance 79
Removal and Replacement 49
Color Monitor Block Diagram
CRT Monitor 113
Communication
I/O Board 312
Communications Configuration Board ... 316
Removal and Replacement 29
XP Main Board 230
Communications Configuration Board - J3
XP Main Board 234
Component Layout
Meters 368
Components
CRT Monitor 112
Hopper 103
Moveable Parts 103
Non-Moveable Parts 103
LCD Panel 119
MC-62 82
Power Supply 63
Sound System 375
Condor 88
Accepted Coins 90
Alarm 91
Basic Operation 88
Cleaning 92
Tools/Equipment Required 92
Connector Pinouts 98
Debris Flap 91
Diagnostics 91
Features 88
Inhibit All 91
Optical and Inductive Sensors 90
Rejected Coins 90
Self Calibration 91
Condor Plus Coin Validator CP133S 88
Configuration
CCB 316
Connection from Backplane Board
Meters 370, 371
Connection to Light Tower Lamps
Meters 372
Connection to Pulse Interface Board
Meters 371
Connector Keying
Backplane 258
Connector P1 - Debug
Backplane 276
Connector P10 - BNA Lights
Backplane 282
Connector P11 - Buttons and Button Lamps
Backplane 283
Connector P12 - Expansion I/O
Backplane 284
Connector P13 - Key Switches and BNA
Backplane 285
Connector P14 - Door Distribution
Backplane 286
Connector P15 - Spare Power
Backplane 287
Connector P16 - Fan
Backplane 287
Connector P17 - Power Supply
Backplane 288
Connector P18 - IGT SAS+ (PT95A) or Bally SDS
Backplane 288
Connector P19 - Broadcast DACOM Port
Backplane 289
Connector P2 - Light Tower/Hard Meters/ NA Security
Backplane 277
Connector P20 - Monitor 2
Backplane 289
Connector P23 - Com2/ Com4 Mikohn
Backplane 290
Connector P27 - Handle, Spare Switch and Com8
Backplane 291
Connector P3 - Logic Door
Backplane 278
Connector P32 - 24V Power
Backplane 291
Connector P33 - Speaker
Backplane 292
Connector P35 - 24V
Backplane 292
Connector P36 - 24V
Backplane 292
Connector P37 - 24V
Backplane 293

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Connector P4 - Monitor 1
Backplane....278
Connector P7 - Hopper/Ticket Printer
Backplane....279
Connector P8 - Com6 and Com7 Spare Serial Outputs
Backplane....280
Connector P9 - Switches and Com7 Spare Serial Outputs
Backplane....281
Connector PIN Assignment
CCB 317
Connector PIN Assignments
Meters....370
Sound System....382
Connector PIN Description: J1
I/O Board....301
Connector PIN Description: J2
I/O Board....303
Connector PIN Description: J3
I/O Board....305
Connector Pinouts
Condor....98
MC-62....87
Connector Pinouts - Main LCD Panel
LCD Panel....125
Connector Pinouts - Top Box
LCD Panel....124
Connectors
+24V Auxiliary Output....74
+24V Fluorescent Output....74
+24V Main Output....74
Auxiliary Power Outlet Output....73
Backplane....259
External Power Outlet Switch....73
LCD Panel....124
Monitor Output....73
Power Outlet Power....73
XP Main Board....233
Connectors (Dual Port)
SPC2391
Connectors (Single Port)
SPC2389
Control Signals
Low Power Mode Signal....71
Power Fail Signal....71
Corporate Profile....7
CPU Core
XP Main Board....218
CRT Monitor....19, 111
Cable Connector....113
Color Monitor Block Diagram....113
Components....112
Degaussing....111
General Description....111
On Screen Display....111
OSD Button Control Panel....115
Brightness....116
Color....116
Contrast....116
Degaussing....118
Language....117
Maintenance....118
Pincushion, Trapezoid, Parallelogram, and PIN Balance....117
Recall....117
Vertical/Horizontal Position and Size....117
OSD Control Panel Layout....114
Power Supply....113
Removal and Replacement....19
Resolution, Temperature and Weight....111
Technical Description....112
Troubleshooting....399
Wells-Gardner....111
Custom Tickets
Epic 950....351
Ithaca 850....363

D

DC Output Voltage Current Limit....71
DC Output Voltage Hold Up....70
DC Output Voltage Over-voltage Protection....70
DC Output Voltage Ripple and Noise....70
DC Output Voltages....69
DC Output Volgage Current Limit....71
DC Output Voltage Hold Up....70
DC Output Voltage Over-voltage Protection....70
DC Output Voltage Ripple and Noise....70
DC Output Voltage Tolerance....69
External DC-DC Converter....71
Shutdown....70
DC Output Voltage Tolerance....69
Debris Flap
Condor....91
Degaussing
CRT Monitor....111
Denomination....37
Diagnostics
Condor....91
DIP Switch Banks

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I/O Board 312
DIP Switch Test
JCM UBA 175
Diverter Solenoid and Photo-Optic Sensor
Basic Operation 78
Coin Handling System 78
General Maintenance 79
Coin Chute Assembly 79
Coin Comparator 79
Coin Validator 79
Photo-optic Sensor 79
Door Switch Monitoring
I/O Board 313
Drop Box 33
Removal and Replacement 33
Dual-Port Configuration
SPC2390

E

EGM 5
External View 14
General Maintenance 59
Internal View 15
Electrical Connections
Backplane 256
Electrical Specifications
Backplane 294
Electromechanical Meters 40, 365, 367
Removal and Replacement 40
Electronic Gaming Machine 14
electronic gaming machine 5
Entry to the Current Lockup Screen
Troubleshooting 395
Epic 950 339
Care and Maintenance 348
Custom Tickets 351
Features 340
Inner Chassis Removal and Replacement 343
Interface Specifications 341
Loading Tickets 344
Printer Mechanism Assembly 343
Printer Status LEDs 350
Removing Loaded Tickets 345
Sensors 346
Chassis Open Sensor/Audible Alarm 347
Cover Open Switch 346
Ticket Burst Sensor 346
Ticket Low Sensor 346
Ticket Taken Sensor 346
Top-of-Form/Ticket Out Sensor 346
Specifications 350
Troubleshooting 349
Expansion I/O
I/O Board 313
External Battery - J10
XP Main Board 238
External DC-DC Converter 71
External I/O Expansion
XP Main Board 224
External Power Outlet Switch
Connectors 73

F

Fan Connector - J1
XP Main Board 233
Features
Condor 88
Epic 950 340
GEN2 326
JCM UBA 155
MC-62 80
WBA 178
XP Main Board 212
Feeding Paper
GEN2 331
Firmware
I/O Board 314
Fluorescent Ballast
Removal and Replacement
Belly Door 57
Fluorescent Lighting
Belly Door 57
Fluorescent Tube
Removal and Replacement
Belly Door 57
Fluorescent Tubes are not Illuminated
Troubleshooting 396
FPGA
XP Main Board 222
Functional Description
CCB 316
I/O Board 296
MC-62 84
XP Main Board 214
Fuse
Power Supply
Removal and Replacement 31
Removal and Replacement 31
FutureLogic GEN2 Ticket Printer 325

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G

GEN2
Clearing a Paper Jam 332
Features 326
Feeding Paper 331
Interface Specifications 327
Loading Paper 330
Printer Errors 337
Printer Status LEDs 336
Removal and Replacement 329
Sensors 334
Specifications 338
Troubleshooting
Self Test 335
General Description
CRT Monitor 111
Meters 365
Sound System 375
General Maintenance 79
CCB 319
EGM 59
Hopper 107
Meters 373
General Sensor Test
JCM UBA 174
Greater than Hopper Payout Limit
Hopper Payout Limit 100

H

Hard Meters
I/O Board 312
Hard Tilts
Troubleshooting 394
High Frequency Speaker Output - J7
Sound System 383
High Frequency Speaker Output - J8
Sound System 383
Hopper
Access and Location 101
Basic Operation 100
Coin Dispensing 105
Coin Jamming Prevention 105
Components 103
Moveable Parts 103
Non-Moveable Parts 103
General Maintenance 107
Physical Description 101
Removal and Replacement 32
Hopper Components 104
Hopper Full Detection 105
Hopper Interface Signals 106
Hopper Payout Limit
Greater than Hopper Payout Limit 100
Less than Hopper Payout Limit 100
How to Use this Manual 5

I

I/O Address Map 308
I/O Board
Address Decoding 308
Button Switches 310
Communication 312
Connector PIN Description: J1 301
Connector PIN Description: J2 303
Connector PIN Description: J3 305
DIP Switch Banks 312
Door Switch Monitoring 313
Expansion I/O 313
Firmware 314
Functional Description 296
Hard Meters 312
Interface 299
Interrupt Request 310
Lamp Drivers 311
Animation and Light Tower Lamps 311
Bill Acceptor Lamps 311
Button Lamps/LEDs 311
Mikohn Interface 310
Opto Isolation 313
Physical Description 296
Power - Isolated Supplies 314
Reset Circuitry 314
Technical Description 299
I/O Data Bus
XP Main Board 220
I/O Expansion Port Interrupts
XP Main Board 221
I/O Signals for Extended I/O Driver Board and Main Board 297
Image Display Settings
LCD Panel 122
Image Specifications
LCD Panel 121
Important Safety Information 6
Indication of Conditions
Troubleshooting 395
Inductive Sensors 90
Inhibit All
Condor 91
Initialize or Clear NVSRAM
SPC2387

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Inner Chassis Removal and Replacement
Epic 950 343
Inputs
External Power Outlet Switch 66
Inrush Current 66
Main Input Hold Up Time.....66
Power Supply Input 66
Inputs and Outputs
Power Supply.....65
Installation
JCM Sentry Bezel 176
Installation and Machine Conditions
JCM UBA 161
JCM WBA..... 184
Mars 144
Interface
CCB 316
I/O Board 299
Meters..... 367
Interface Connector
JCM UBA 160
JCM WBA..... 183
Mars 149
RS232 EBDS Version.....149
Interface Signals
CCB 316
Interface Specifications
Epic 950 341
GEN2.....327
Ithaca 850 353
Interface with the Power Control System
XP Main Board.....231
Interrupt Request
I/O Board 310
Interrupt System
XP Main Board..... 220
Introduction 4
XP Main Board.....212
Ithaca 850 352
Care and Maintenance 361
Cleaning the Print Head.....361
Custom Tickets..... 363
Interface Specifications..... 353
Loading and Replacing Tickets 356
Location and Access..... 356
Printer Mechanism Assembly..... 355
Printer Mechanism Assembly Removal 355
Printer Status LEDs..... 362
Removing Loaded Tickets..... 358
Sensors..... 359
Head-Up Switch..... 359
Open/Close Position Sensor/Audible Alarm 360
Paper Low..... 359
Ticket Taken Sensor..... 359
Top-of-Form Sensor..... 359
Specifications..... 363
Tickets..... 356
Troubleshooting..... 362
Ithaca 850 Ticket Printer..... 352
Ithaca Epic 950 Ticket Printer..... 339

J

J1 to J1 Extended I/O Driver II Board Connector
Backplane..... 269
J2 to J2 Extended I/O Driver Board II Connector
Backplane.....271
J3 to J3 on the Extended I/O Driver II Board
Backplane.....273
Japan Cash Machine..... 154
JCM Sentry Bezel 176
Installation.....176
Troubleshooting.....177
JCM UBA
Anti-pullback Error Conditions
Appendix A..... 200
Assembly (Acceptor and Transport) Removal 163
Bill Acceptance Test DIP Switch Settings
Appendix A.....201
Bill Jam Near the Bill Acceptor's Entrance 165
Bill Jam Near the Cashbox Entrance ..165
Bill Stacker Test Error Conditions
Appendix A..... 198
Calibration 168
Adjustment Procedure 169
In-machine Auto-calibration 168
Set Black Reference Paper 170
Set UV Reference Paper 170
Set White Reference Paper 169
UBA Adjust Tool Screen 169
Workbench Auto-calibration 168
Cashbox Removal.....162
Cashflow Bill Acceptor Diagnostic Codes
Appendix A.....197
Centering Mechanism Error Conditions
Appendix A..... 200
Cleaning.....166, 167
Clearing Bill Acceptor Jams 165

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Features..... 155
Installation and Machine Conditions..161
Interface Connector 160
LED Reject Codes
Appendix A..... 205
Malfunction LED Error Codes
Appendix A..... 203
Physical Description..... 156
Running Test Error Conditions
Appendix A..... 199
Security.....157
Acceptor..... 158
Bill/Voucher Entry..... 159
Cashbox..... 158
Mechanics and Transport.....157
Solenoid Mechanism Error Conditions
Appendix A..... 200
Transport Motor Speed Test Error Conditions
Appendix A..... 198
Troubleshooting.....171
JCM Universal Bill Acceptor 154
JCM WBA
Calibration 189
Auto-calibration Procedure..... 189
In-machine Auto-calibration 189
Workbench Auto-calibration 189
Removal and Replacement 185
Return Codes for Tests 8 and 9
Table 1.....207
Table 2..... 208
Security..... 180
Acceptor.....181
Bill/Voucher Entry..... 182
Cashbox.....181
Mechanics and Transport..... 180
Troubleshooting..... 190
Acceptor Sensor Sub-Test..... 192
Bill Receiving Test without Cashbox 195
Determining Test Results 192
Initiating a Test.....191
Issues and Remedies 196
Transport Sensor Sub-Test 194
JCM World Bill Acceptor 178
JP20 to P20 Main Board Connector Backplane..... 259
JP21 to P21 Main Board Connector Backplane..... 266
JP22 to P22 Main Board Connector Backplane..... 263

K

Key Switches
Removal and Replacement 17

L

Lamp Drivers
Animation and Light Tower Lamps
I/O Board 311
Bill Acceptor Lamps
I/O Board 311
Button Lamps/LEDs
I/O Board 311
I/O Board 311
Latching
Belly Door 55
Main Door 45
Layout
XP Main Board.....217
LCD Panel 20, 119
4-PIN Minifit Connector PIN Connections. 123
Brightness Adjustment Range..... 122
Components 119
Connector Pinouts - Main LCD Panel. 125
Connector Pinouts - Top Box.....124
Connectors 124
Image Display Settings 122
Image Specifications.....121
Main 133
On Screen Display Control.....127
OSD Control 127
OSD Panel
Auto Adjusting 132
Brightness 128
Color..... 129
Contrast 129
Image Menu 130
Vertical/Horizontal Position 130
Language.....131
Location and Access.....127
No Signal Display 132
Recall 132
Power 123
Power Detection and Power Save Request 126
Removal and Replacement 20
Specifications 120
Supported Video Timings 121
Sync Input Signal Characteristics 120

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Top Box 133
Video Input Signal Characteristics 120
Wells Gardner 119
LCD Power Detection
Signal Definition 126
LED Diagnostic Codes
Mars 153
LED Operation
SPC2386
LED Reject Codes
JCM UBA
Appendix A 205
Less than Hopper Payout Limit
Hopper Payout Limit 100
Light Tower 36
Conditions 37
Denomination 37
Functions 37
Light Tower Driver & Belly Panel Door Security Interfaces
Meters 367
Light Tower Filter
Removal and Replacement 38
Loading and Replacing Tickets
Ithaca 850 356
Loading Paper
GEN2 330
Loading Tickets
Epic 950 344
Location and Access
CCB 316
Coin Handling System 77
Ithaca 850 356
Ticket Printers 323
Locks
Removal and Replacement 18
Logic Cage 24
Removal and Replacement 25
Low Frequency Speaker Output - J6
Sound System 383
Low Power Mode Signal 71

M

Machine Condition Indicators 145
Machine Conditions
Ticket Printers 323
Machine Lockup
Troubleshooting 395
Machine Pay Out
MC-62 85
Main Board
Removal and Replacement 26
Main Display
Monitors 110
Main Display Area
CRT Monitor 19
LCD Panel 20
Touch Screen 21
Main Door
Belly Door 54
Button Panel 47
Coin Handling System 49
Coin Tray 58
Latching 45
Play Buttons 50
Plug Breaks 43
Removal and Replacement 44
Main Door Components
Belly door assembly and security 13
Coin entry mechanism 13
Main door assembly and security 13
Mid trim assembly 13
Play buttons 13
Main Door Latching
Removal and Replacement 46
Main Door Security Switch 16
Main LCD Panel 133
Troubleshooting 398
Malfunction LED Error Codes
JCM UBA
Appendix A 203
Mars
Bill Acceptor Removal 151
Calibration 153
Care and Maintenance 152
Cashbox Removal 150
Cashbox Replacement 150
Clearing Bill Acceptor Jams 151
Features 146
Interface Connector 149
LED Diagnostic Codes 153
Physical Description 147
Removal and Replacement 150
Security 147
Acceptor Module 147
Bill/Coupon/Voucher Entry 148
Cashbox 148
Chassis 147
Mechanics and Transport 147
Troubleshooting 153
MC-62 80
Accepted Coins 81
Alarm 81

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Basic Operation....81
Coin Accept Solenoid....85
Coin Handling System....80
Components....82
Connector Pinouts....87
Features....80
Machine Pay Out....85
Parts List....83
Photo-optic Sensor....85
Rejected Coins....81
Replacing the Sample Coin....86
Scanner....84
Sensor Assembly....84
MC-62 Coin Comparitor....80
Mechanical Details
Power Supply....75
Mechanical Switch
Removal and Replacement....16
Mechanical Switches
XP Main Board....232
MEI Cashflow (Mars)....146
Memory
XP Main Board....219, 225
Memory Expansion Board - J12
XP Main Board....238
Meter Detection
Meters....367
Meters 40
Backplane Connections to Pulse Interface Board....371
Component Layout....368
Connection from Backplane Board....370, 371
Connection to Light Tower Lamps....372
Connection to Pulse Interface Board..371
Connector PIN Assignments....370
General Description....365
General Maintenance....373
Interface....367
Light Tower Driver & Belly Panel Door Security Interfaces....367
Meter Detection....367
Overcurrent Protection....367
Pulse Interface Board....369
Removal and Replacement....40
Structure and Components....368
Technical Description....366
Microprocessor
XP Main Board....218
Mikohn Interface
I/O Board....310
Mikohn Link Progressive Interface
XP Main Board....232
Miscellaneous Connector - P22
XP Main Board....247
Monitor Output
Connectors....73
Monitor Output EMC Filtering....67
Monitor Output Zero Switching
Monitor Output EMC Filtering....67
Monitors
Main Display....110
Overview....110
Top Box....110
Touch Screen....110
Moveable Parts
Hopper....103

N

Non-Moveable Parts
Hopper....103
No Power
Troubleshooting....396

O

Offices 8
On Screen Display
CRT Monitor....111
On Screen Display Control
LCD Panel....127
On Screen Display Controls
CRT Monitor....114
Operating Environment
Power Supply....72
Operator Mode Menu Indicators....145
Ticket Printers....324
Optical and Inductive Sensors
Condor....90
Inductive Sensors....90
Optical Sensor....90
Optical Sensor....90
Opto Isolation
I/O Board....313
OSD Button Control Panel
CRT Monitor....115
Brightness....116
Color....116
Contrast....116
Degaussing....118
Language....117
Maintenance....118
Pincushion, Trapezoid, Parallelogram,

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and PIN Balance 117
Recall 117
Vertical/Horizontal Position and Size 117
OSD Control
LCD Panel 127
Location and Access 127
OSD Control Panel Layout
CRT Monitor 114
OSD Controls
CRT Monitor 114
OSD Panel
LCD Panel
Auto Adjusting 132
Brightness 128
Color 129
Contrast 129
Image Menu 130
Vertical/Horizontal Position 130
Language 131
No Signal Display 132
Recall 132
Outputs
AC Monitor Output Voltage 67
Auxiliary Output Voltage 68
Control Signals 71
DC Output Voltages 69
Monitor Output 67
Monitor Output Zero Switching 67
Monitor Output EMC Filtering 67
Overcurrent Protection
Meters 367
Overview
Coin Handling System 77
Monitors 110
Ticket Printers 323

P

Panic Messages
Troubleshooting 406
Part Number
CCB 316
Parts List
MC-62 83
PCI Mezzanine Connector - J5
XP Main Board 236
PCI Mezzanine Connector - J6
XP Main Board 237
Peripherals
XP Main Board 219
Photo-Optic Sensor
MC-62 85
Physical Description
Backplane 252
CCB 316
Hopper 101
I/O Board 296
JCM UBA 156
Power Supply 62
WBA 179
XP Main Board 213
PIN Connections
Cable Connector
CRT Monitor 113
Play Button LED
Removal and Replacement 52
Play Button LEDs do not Illuminate
Troubleshooting 397
Play Button Legend (Label)
Removal and Replacement 52
Play Buttons 50
Player Marketing Module 39
Removal and Replacement 39
Plug Breaks 43
PMM 39
Removal and Replacement 39
PMM Security Switch 16
Power
LCD Panel 123
Power - Isolated Supplies
I/O Board 314
Power Detection and Power Save Request
LCD Panel 126
Power Fail Signal 71
Power Outlet Power
Connectors 73
Power Requirements
Sound System 381
Power Supply 31
Access and Location 62
AC Monitor Output Voltage 67
Auxiliary Output Voltage 68
Basic Operation 64
Block Diagram 64
Components 63
Control Signals 71
CRT Monitor 113
DC Output Voltages 69
External Power Outlet Switch 66
Fuse
Removal and Replacement 31
Inputs and Outputs 65

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Inrush Current 66
Main Input Hold Up Time 66
Mechanical Details 75
Monitor Output 67
Monitor Output Zero Switching 67
Monitor Output EMC Filtering 67
Operating Environment 72
Physical Description 62
Removal and Replacement 31
Storage Environment 72
Power Supply Input 66
Printer Errors
GEN2 337
Printer Mechanism Assembly
Epic 950 343
Ithaca 850 355
Printer Mechanism Assembly Removal
Ithaca 850 355
Printer Status LEDs
Epic 950 350
GEN2 336
Ithaca 850 362
Product Profile 7
Progressive Systems 7
Proprietary Copyright Notice 3
PSA-66-ST2 325
Pulse Interface Board
Meters 369

R

Real Time Clock
XP Main Board 226
Rejected Coins
Condor 90
Removal
Bill Acceptor 151
Removal and Replacement
Backplane Board 27
Backplane Type 2 Board 27
Bashbutton LED 53
Belly Door Latching 56
Bill Acceptor Cage 30
Button Panel 48
CCB 29
Coin Acceptor 49
Coin Comparator 49
Coin Tray 58
Coin Validator 49
Communications Configuration Board 29
CRT Monitor 19
Drop Box 33
Electromechanical Meters 40
Fluorescent Ballast
Belly Door 57
Fluorescent Tube
Belly Door 57
GEN2 329
Hopper 32
I/O Board 28
JCM WBA 185
Key Switches 17
LCD Panel 20
Light Tower Filter 38
Locks 18
Logic Cage 25
Main Board 26
Main Door 44
Main Door Latching 46
Mars 150
Mechanical Switch 16
Meters 40
Play Button LED 52
Play Button Legend (Label) 52
Player Marketing Module 39
PMM 39
Power Supply 31
Fuse 31
Sound System 42
Ticket Printer 41
Top Box Bezel 34
Top Box LCD Panel 35
Touch Screen 21
XP Main Board 26
Removing Loaded Tickets
Epic 950 345
Ithaca 850 358
Replacing the Sample Coin
MC-62 86
Reset
XP Main Board 224
Reset Circuitry
I/O Board 314
Resolution, Temperature and Weight
CRT Monitor 111
Return Codes for Tests 8 and 9
JCM WBA
Table 1 207
Table 2 208
Running Test
JCM UBA 172
Running Test Error Conditions
JCM UBA
Appendix A 199

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S

Scanner
MC-62 84
Security 147
Acceptor
JCM WBA 181
Backplane 255
Bill/Voucher Entry
JCM WBA 182
Cabinet, Door and Top Box 16
Cashbox
JCM WBA 181
JCM UBA 157
Mechanical Switch
Removal and Replacement 16
Mechanics and Transport
JCM WBA 180
WBA 180
XP Main Board 227
Security and I/O Expansion Connector - P21
XP Main Board 244
Self Calibration
Condor 91
Sensor Assembly
MC-62 84
Sensors
Epic 950 346
Chassis Open Sensor/Audible Alarm 347
Cover Open Switch 346
Ticket Burst Sensor 346
Ticket Low Sensor 346
Ticket Taken Sensor 346
Top-of-Form/Ticket Out Sensor 346
GEN2 334
Drawer Open 334
Paper Low 334
Paper Out 334
Paper Taken 334
Printer Open 334
Ithaca 850 359
Head-Up Switch 359
Open/Close Position Sensor/Audible Alarm 360
Paper Low 359
Ticket Taken Sensor 359
Top-of-Form Sensor 359
Serial Channels
XP Main Board 230
Serial Communications Interface
XP Main Board 219
Serial Protocol Converter board 385
Setup and Configuration
SPC2388
SH 4 Timers
XP Main Board 221
Shutdown 70
Signal Definition
LCD Power Detection 126
Single-Port Configuration
SPC2388
Soft Tilts
Troubleshooting 394
Solenoid Mechanism Error Conditions
JCM UBA
Appendix A 200
Solenoid Test
JCM UBA 173
Sound
Troubleshooting 400
Sound System 42
24V Input - J1 382
Adjusting Output Levels 377
Audio Amplifier PCBA 379
Audio Input - J5 382
Audio Input Specifications 377
Audio Output Specifications 377
Components 375
Connector PIN Assignments 382
General Description 375
High Frequency Speaker Output - J7 . 383
High Frequency Speaker Output - J8 . 383
Low Frequency Speaker Output - J6 .. 383
Power Requirements 381
Removal and Replacement 42
Technical Description 378
SPC2 385
Basic Operation 385
Connectors (Dual Port) 391
Connectors (Single Port) 389
Initialize or Clear NVSRAM 387
LED Operation 386
Setup and Configuration 388
Single-Port Configuration 388
Speaker Amplifier Assembly 376
Specifications
Coin Handling System 77
Epic 950 350
GEN2 338
Ithaca 850 363
LCD Panel 120
Touch Screen 140

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SPI Bus Driver and Multiplexer Circuitry
XP Main Board..... 229
Stacker Test
JCM UBA 172
Startup Messages
Troubleshooting..... 405
Storage Environment
Power Supply.....72
Structure and Components
Meters..... 368
Supported Video Timings
LCD Panel 121
Sync Input Signal Characteristics
LCD Panel 120
System Connectors
Backplane..... 255
System Overview
Backplane..... 254

T

Technical Description
Cabinet, Door and Top Box.....15
CRT Monitor..... 112
I/O Board 299
Meters..... 366
Sound System 378
XP Main Board.....216
Ticket Printer 41
Removal and Replacement 41
Ticket Printers
Location and Access..... 323
Machine Conditions..... 323
Operator Mode Menu Indicators.....324
Overview 323
Troubleshooting..... 408
Tickets
Ithaca 850..... 356
Tilt/Error Conditions
Troubleshooting..... 394
Tools/Equipment Required
Cleaning
Condor 92
Condor
Cleaning.....92
Top Box
Bezel34
Electromechanical Meters.....40
LCD Panel 35
Light Tower 36
Meters.....40
Monitors.....110
Player Marketing Module.....39
Sound System 42
Ticket Printer 41
Top Box Bezel
Removal and Replacement 34
Top Box Bezel (Security) Switch 16
Top Box Components
Electromechanical meters.....13
Light tower 13
Player marketing module.....13
Sound system.....13
Top box assembly, lighting and artwork13
Top box LCD panel 13
Top Box LCD Panel 133
Removel and Replacement 35
Top Tox Components
Ticket printer 13
Top box assembly and security 13
Touch Screen.....21
3M Touch Systems..... 135
Calibration and Test..... 139
ClearTek™ II..... 135
Functionality 136
Handling 138
Interface 137
Machine Interface..... 136
Monitors.....110
Operation..... 135
Performance..... 136
Durability 136
Resolution and Sensitivity..... 136
Removal and Replacement 21
Specifications 140
Trademarks.....3
Transport Motor Speed Test
JCM UBA 171
Transport Motor Speed Test Error Conditions
JCM UBA
Appendix A..... 198
Troubleshooting
3 Way Metering Error Message..... 404
Anti-Pullback Mechanism Test 172
Bill Acceptance Test..... 174
Bill Acceptors..... 408
Centering Mechanism Test.....173
Coin Acceptors 408
Coin Handling System.....401
CRT Monitor..... 399
DIP Switch Test.....175
Entry to the Current Lockup Screen... 395
Epic 950 349

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Printing a Self-Test Ticket 349
Self-test Ticket..... 349
Fluorescent Tubes are not Illuminated..... 396
General Sensor Test..... 174
Hard Tilts 394
Indication of Conditions..... 395
Ithaca 850..... 362
JCM Sentry Bezel 177
JCM UBA 171
JCM WBA..... 190
Acceptor Sensor Sub-Test..... 192
Bill Receiving Test without Cashbox 195
Determining Test Results 192
Initiating a Test.....191
Issues and Remedies 196
Transport Sensor Sub-Test 194
Machine Lockup..... 395
Main LCD Panel..... 398
Mars 153
No Power..... 396
Panic Messages 406
Play Button LEDs do not Illuminate 397
Running Test.....172
Self Test
GEN2..... 335
Soft Tilts..... 394
Solenoid Test.....173
Sound..... 400
Stacker Test.....172
Startup Messages..... 405
Ticket Printers 408
Tilt/Error Conditions..... 394
Transport Motor Speed Test 171

U

UBA Bill Acceptor..... 154
User Response 425

V

Video
XP Main Board..... 223
Video Input Signal Characteristics
LCD Panel 120

W

Warnings, Cautions, and Notes.....5
WBA 178
Features.....178
Physical Description.....179
Security..... 180
Wells-Gardner
CRT Monitor.....111
LCD Panel 119

X

XP Main Board.....218, 225
Audio 223
Backplane Connector (Comms) - P20 241
Battery Backup Circuit 226
Communications Configuration Board230
Communications Configuration Board - J3 234
Connectors 233
CPU Core.....218
External Battery - J10..... 238
External I/O Expansion 224
Fan Connector - J1 233
Features.....212
FPGA222
Functional Description.....214
I/O Expansion Port Interrupts 221
Interface with the Power Control System . 231
Interrupt System..... 220
Introduction 212
Layout 217
Mechanical Switches..... 232
Memory.....219
Memory Expansion Board - J12 238
Mikohn Link Progressive Interface 232
Miscellaneous Connector - P22 247
PCI Mezzanine Connector - J5..... 236
Peripherals 219
Physical Description.....213
Real Time Clock..... 226
Reset.....224
Security.....227
Security and I/O Expansion Connector - P21 244
Serial Channels..... 230
Serial Communications Interface 219
SH 4 Timers.....221
SPI Bus Driver and Multiplexer Circuitry... 229
Technical Description.....216
Video 223

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